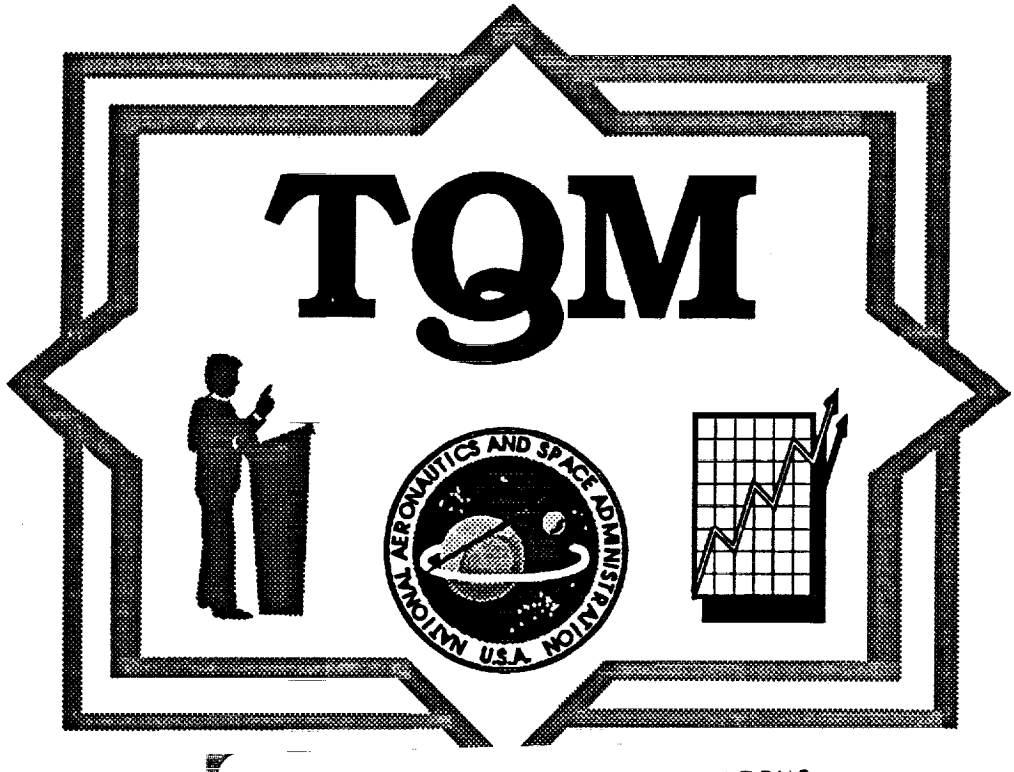
NASA-TM-108106

NASA STI PROGRAM

COORDINATING COUNCIL

Ninth Meeting — OCTOBER 28, 1992



SUMMARY

NASA STI Program Coordinating Council

9th meeting

Total Quality Management

Wednesday, October 28, 1992
Crystal City Gateway 2 Conference Room

Attendees:

JTT
- Katie Bajis
- Lisa Burdick
- Kenneth Carroll
- Jim Erwin
- Jennifer Garland
- Laurie Harrison
- Robert Jack
- Karen Kaye
- John McLane
- Ann Normyle
- Terese Ohnsorg
- Roland Ridgeway
- Lou Ann Scanlan
- Ron Sepic
- Patt Sullivan
- Teresa Taylor
- Phil Thibideau
- Dick Tuey
- Kay Voglewede

AIAA
- Tony Lenti
- Richard Miller
- Geoff Worton

CASI
- Lee Blue
- Wanda Colquitt
- Carl Eberline
- Joe Gignac
- Mark Jeschke
- Jim Schroer
- Roy Stiltner
- Mike Streeks
- Chuck Walsh

T
- Marge Gildenhorn
- Joseph McElwee

Patent and Trademark Office
- Ron C. Adams
- Anne Kelly

MITRE
- Kristin Ostergaard

PMI
- Gardner Shaw

TOTAL QUALITY MANAGEMENT (TQM)

Patt Sullivan, JTT, opened the 9th meeting of the STI Coordinating Council on October 28. The council listened to speakers' understanding of Total Quality Management (TQM) principles and heard stories of successful application of these principles. Wanda Colquitt and Jim Schroer from CASI and Tony Lenti from AIAA related their understanding and experience, as did Anne Kelly and Ron Adams from the Patent and Trademark Office. Joe McElwee, Director, Internal Total Quality Management Division, NASA Office of Continual Improvement (Code T), spoke of his office's efforts to ensure that TQM becomes a way of life throughout NASA. Finally, Marge Gildenhorn, also of Code T, and Gardner Shaw of Process Management International offered some insight into TQM management practices.

Input Processing Success

Ms. Colquitt, Director of Operations and Analysis, began a definition of quality that focuses on customer satisfaction, whether the customer is external or internal (i.e., another department). She defined a customer as anyone who receives any product or service from you. The first step is to build a quality infrastructure that ensures meeting the customer's needs not only today, but tomorrow as well. To meet and anticipate the customer's needs, we must anticipate requirements and product innovations. Success requires quick decision-making, teamwork, and cooperation. CASI's goal is to refine processes to build in the quality that will result in measurably improved products and services which, in turn, will satisfy the customer. Critical to success are communication and trust, and culture change. As a manager, you must develop your employees' ability to change, and empower them to do so. The environment must be hospitable to change, and it is up to you to foster this attitude. The foundation you build must allow you not only to meet customer requirements, but to anticipate and exceed them. The process begins with upper management, and gradually filters down to the lower levels. The goal is to continually improve all processes. Building quality into the processes guarantees quality in the products and services.

The particular project that Ms. Colquitt used as an example was revised input processing. The system needed to be revised in response to customer needs. The two initial goals were 1) to get all documents into

the database within 1 week, and 2) to improve microfiche distribution. At first the staff was not receptive, and didn't think the existing processes could be improved upon.

The first step was an analysis of the current process. Input processing had been following one basic procedure, but with a variety of exceptions to accommodate special or changed requirements. Next, a cross-functional team was created, comprising staff from five functional areas: Input Processing, Micrographics, STI Support, Business Operations, and Publications. All are involved in some degree in the creation and production of *STAR*. *STAR* is produced so frequently that at any given time there are three issues in various stages of production. This situation makes it difficult to know where to begin changing the process. Step 3 was to identify the root problem. Step 4 was to develop a new process. Reaching consensus was step 5. Step 6 was to define a measurable goal. This goal turned out to be 1) process 100 documents a day, and 2) get all documents to micrographics the following day.

The process of change was not an easy one, provoking anxiety, fear, and insecurity among the staff. Programs had to be rewritten, the processing flow was altered, all STAR issues then in micrographics had to be completed, schedules had to be developed for the new procedures, and daily communication among team members had to be maintained.

Lessons learned were that the culture shift toward change did not come easily nor immediately. Communication was essential to the success of the project; the staff came to value communication. Once the staff was committed to the change and communication was maintained, they met or exceeded the goals they had set for themselves. Trust is essential to success; trust must be built step by step.

Three-Day Turnaround

Jim Schroer, Manager, STI Products Division, presented another success story from CASI. The tangible goal was to establish a 3-day turnaround in document order processing. More important, the goal was to instill a new attitude and a "burgeoning sense of urgency" in the employees. Using TQM results in a win-win environment, in which the employees own the process, the process continually improves, and the product or end result concomitantly improves. Costs are lower, revenue is increased.

The first step is to lay a foundation for TQM. A sense of urgency, of ownership, of commitment, and of trust must be instilled in the team.

Mr. Schroer emphasized four aspects of TQM in the model he presented: customer orientation and customer satisfaction; continuous improvement of the process; metrics, or ways to measure progress; and empowerment of the staff, which in turn engenders commitment and responsibility.

The goal in this instance was to reduce the turnaround time for document order processing to 3 days, for at least 80 percent of document orders. First a process action team, or tiger team, was formed, and daily meetings were instituted. Means were created for daily reporting of results: "If you can't measure it, you can't improve it." Problems were defined: some were internal, therefore fixable, and some external, or beyond the control of the staff. The huge backlog of orders that existed was eliminated within 2 or 3 weeks.

Lessons learned here were that training in TQM is essential for the necessary culture shift; simple metrics to measure results were enormously helpful; the entire team and some individuals deserved reward (and recognition promotes ownership); communication (again) was crucial to the process; and quality improvement required hard work, not cheerleading.

Quality Assessment at AIAA/TIS

Tony Lenti, Manager of Editorial Operations at AIAA/Technical Information Service, presented the third case study on TQM. He used the documents that AIAA/TIS processes as a resource tool to learn about TQM, and adapted the TQM guidelines for manufacturing to his service industry.

The themes he adopted for his TQM campaign were 1) to develop and enhance existing tools, and 2) to assess quality. He assembled a quality circle bringing indexers, abstracters, and proofreaders together. In the beginning they resisted the idea, but gradually became more focused and were able to keep their Team 1 meetings to half an hour. Mr. Lenti found that his presence as leader tended to hinder discussion, so he began coming to the meetings after the discussion was well under way; that approach worked better. Using problem solving techniques, Team 1 addressed bottlenecks, repetitive procedures, and efficiency, with good

results. Team 1 achieved an organizational awareness and a sense of family.

Team 2 concentrated on process analysis and flowcharting. Hidden talents, especially systems analysis, were discovered among the team members. Team 2 kept records of errors found in records, in the titles and the citations, and by so doing reduced that number significantly. AIAA instituted an incentive award program; now employees are nominating each other.

Team 3 is currently in place, with Process Action Teams spun off from the principal team. The various teams are working fairly independently. They have reduced the turnaround time for interlibrary loans to NASA Centers.

Quality teams are fast becoming an integral part of the TIS work style. Measurement is important: output units, financial data, errors caught, real production vs. schedule. The next step is to find a way to measure customer satisfaction.

Lessons learned are that Continual Improvement is exhilarating, not scary. Staff members are making more suggestions, money is being saved, productivity is up, and the staff's analytical skills are improved. There are fewer complaints. TQM is here to stay: it works.

TQM at NASA

Joe McElwee, Director of the Internal Total Quality Management Division, Office of Continuous Improvement (Code T), began his presentation by commenting that the office was in the process of changing its name to Office of Continual Improvement (CI). This, of course, is an improvement.

Ten years ago NASA had an analogous office called the office of Productivity Improvement and Quality Enhancement (PIQE). In June 1992 Dr. Laurie A. Broedling was appointed Associate Administrator for Continual Improvement. NASA Centers and contractors have been practicing a form of TQM for years; Lewis Research Center and Johnson have each won awards. This new Headquarters office is tasked with coordinating TQM practices throughout NASA and getting all of NASA to speak the same TQM language and to strive to meet the same criteria. The criteria used will be those of the Department of Commerce

Baldrige Award for Quality. NASA Headquarters has a Continual Improvement Council, and there are similar councils set up at the Centers.

Senior managers at NASA are now participating in training, the goal of which is to transform the existing CI practices to NASAwide TQM. There are (will soon be?) TQM colloquia on NASA Select television. Code T's goal is to achieve a critical mass of influential people committed to TQM within 3 years.

Patent and Trademark Office

Anne Kelly, Director of International Patent Review, and Ron Adams, Information Processing Division Manager, described the improvements they had made at the Patent and Trademark Office. They have been practicing TQM since 1989.

They presented a "before" picture in which the 200 clerical employees who examined patent applications did not know how their actions fit into the overall mission of the Patent and Trademark Office, who their customers were, or why they were doing their jobs. There were no measurement systems in place to track their productivity. The goals that Ms. Kelly set were to improve timeliness, production, and quality.

In the microfilming area, the employees were working with obsolete equipment; the microfilms they made were developed elsewhere, so they had no immediate feedback; a third of their work had to be redone. The first thing Mr. Adams did was to research and purchase new equipment: he always took one of his employees along to do this, thus giving them ownership of the process. One of the new machines was computerized and programmable, but none of the staff knew anything about computers; Mr. Adams provided training. He was also able to advance all of them one GS grade, and to cross train them so that if someone was out sick another staff member could do that job.

Mr. Adams introduced his staff to the AIIM and ANSI standards for micrographic images. They now apply those standards to their work. The operation has been streamlined from 47 employees to 38; overtime had been a way of life, and now is down to almost nothing. No major decisions are made without participation of the team. The employees wrote their own performance standards, and drew up the floor plan for their space when they moved recently. Metrics are in place to keep

track of errors (including whose errors; i.e., which employee or which machine) and productivity. Quality has improved from 85 percent to 97 percent.

Customers: A Focus on Assets

Marge Gildenhorn of Code T led an interactive session focusing on customers. She asked participants who their customers were. Answers ranged from NASA (for contractors) to scientists and engineers who read NASA publications or use the database to a co-worker who performs the next step of a fixed process. How do you find out what your customer wants? Ask! But the customer doesn't always know, and you don't always find out through surveys and focus groups. Sometimes you have to second-guess your customers and anticipate their needs. Continual communication is key. Ms. Gildenhorn told participants to first determine the requirements, then organize to meet them. TQM is implemented by the plan-do-study-act (PDSA) cycle: first you plan what you're going to do, then you try it out (do). Next, you analyze the results of the change you made (study), then act on what you learned (act). Then, because the process is a cycle, you continue it by planning the next improvement in the process or by expanding its scope.

Linking Process Measures with Results

Gardner Shaw of Process Management International presented an informal, interactive session on the relationship between process and results. A process requires input (from people, materials, machines, methods, environment), a transformation (the process), and output (the product or service). You can measure the result, and you can also measure the process by taking measurements of subprocesses along the way.

The typical graphic representation of a process is a flowchart. With a flowchart, you can easily see the subprocesses involved, and you can see the suppliers and customers for each step.

To link process measures with results, first learn about the process. Who owns it? What is its purpose, what is its output? How does it flow? Who are the customers, and what are their requirements? Who are the suppliers and what are their capabilities? What measures should you use to monitor the process? What are the problems?

To improve results, improve the process. Is it stable? What are the problems? What are the causes of the problems? How do we test the

solutions? How do we judge improvement? How do we monitor the improved process? How do we maintain our gains?

To improve the process, collect data. Learn about the customers: what are their needs, what are their expectations? There are two voices to listen to, the customer and the process itself.

To collect data, follow the PDSA cycle. Act means adopt, adapt, or abandon. Measure the current process performance. Measure the impact of changes through the PDSA cycle. Note signs of potential problems: they'll show up in the measurements. You will thus be measuring the effectiveness from the customer's point of view, its efficiency in time and cost, and its adaptability to special requests.

To continue to improve, continue to apply the PDSA cycle.

What JTT Expects from TQM

Jim Erwin from the STI Program Office at Headquarters (Code JTT) felt that NASA needs to adopt TQM to keep competitive. The goal is to work smarter, not necessarily harder.

NASA expects its contractors to continually examine their operations and products for relevance, efficiency, effectiveness, and quality. They can establish and evaluate their quality standards better than their management can. Implementing TQM might change the existing relationships between NASA and its contractors. Code JTT's current contractors, AIAA and RMS Associates, know what they are doing and have bought into the TQM process.

What effect will TQM implementation have on low-bid contracting? There is an international standard, ISO 9000, to evaluate suppliers and contractors for TQM. NASA needs to look at its contracting procedures and find ways to incorporate these TQM criteria into the contracting process.

CASI'S DEFINITION OF QUALITY

- **Emphasis is on customer requirements - both internal and external.**
- **Improving today's products and services to support the requirements of Aerospace and Space Science Community.**
- **Building a quality infrastructure that ensures that our next generation improvements continue to support requirements of Aerospace and Space Science Community.**

Quarterly Coordinating Council Meeting
October 28, 1992

GOAL

- **Refine processes to build in the quality that will result in improved products and services.**

APPROACH

- **Build trust among all staff.**
- **Build a culture that promotes change.**
- **Diagnose and correct problems within processes continuously to improve products and services.**

WHAT WE HAVE ACCOMPLISHED

- **Measurable improvements in Input Processing, Micrographics, and User Services.**
- **Recognition that processes can be improved to achieve greater productivity.**
- **Recognition that improvements can be achieved continuously.**
- **Better communication across functional areas.**
- **A foundation for moving to more formalized program.**

REVISED INPUT PROCESSING

ONE EXAMPLE

Begun in response to the customers need to have information more quickly.

Goal 1: Reduce Time required to process technical reports for the Aerospace Database.

Goal 2: Reduce the time required for microfiche distribution.

METHODOLOGY

- Perform an analysis of current processes
- Create cross-functional team
- Identify root problem
- Develop new processes
- Reach consensus
- Develop measurable goals

SOLUTION

- **Process completely 100+ reports in Input Processing each day.**
- **Send all processed reports to Micrographics for processing the following day.**

IMPLEMENTATION REQUIREMENTS

- Change programs for input processing and publications.
- Change processing flow in Input Processing.
- Complete all STAR issues in Micrographics.
- Develop schedules for new processes.
- Continue daily communication with team members.

IMPLEMENTATION SUCCESSES

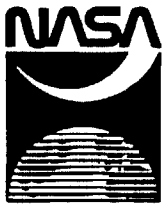
- **Team came to value communication - met on a daily basis to keep consensus.**
- **Input Processing began a month early to "practice"**
- **Micrographics worked to clear all reports in process**
- **Publications and Operations worked to fit schedules to the new process.**

Quarterly Coordinating Council Meeting October 28, 1992

- **ADP Technologies worked with each section to ensure programming requirements were met.**
- **Met all goals of the project.**

LESSONS LEARNED

- Culture shift must occur
- Communication the greatest factor
- Team commitment/consensus/buy-in necessary
- Feedback essential
- Must meet/exceed user requirements
- Trust important



STI PROGRAM
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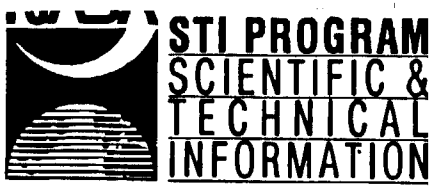
TECHNICAL
INFORMATION

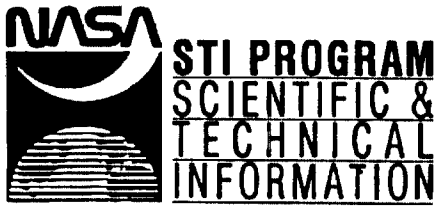
STI COORDINATING COUNCIL: NINTH MEETING

OCTOBER 28, 1992

TOTAL QUALITY MANAGEMENT



CENTER FOR AEROSPACE INFORMATION and TOTAL QUALITY MANAGEMENT: A NEW ATTITUDE



AGENDA

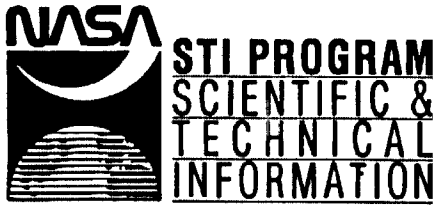
- Foundation
- Model
- 3-Day Turnaround
- Results
- Lessons Learned

STI PROGRAM
SCIENTIFIC &
TECHNICAL
INFORMATION

FOUNDATION

- TQM Benefits Employees
- TQM Benefits Customers
- TQM Benefits the Organization

NASA TEAM
EXCELLENCE



FOUNDATION

- URGENCY
- OWNERSHIP
- COMMITMENT
- TRUST
- INITIATIVE

MODEL

Customer Orientation

Continuous Improvement

Metric System

Empowerment

NASA STI PROGRAM
SCIENTIFIC &
TECHNICAL
INFORMATION

3-DAY TURNAROUND: Overview

FOCUS and GOAL

Achieve a 3-day turnaround for at least 80% of document orders requested through CASI.

NASA TEAM EXCELLENCE

STI PROGRAM
SCIENTIFIC &
TECHNICAL
INFORMATION

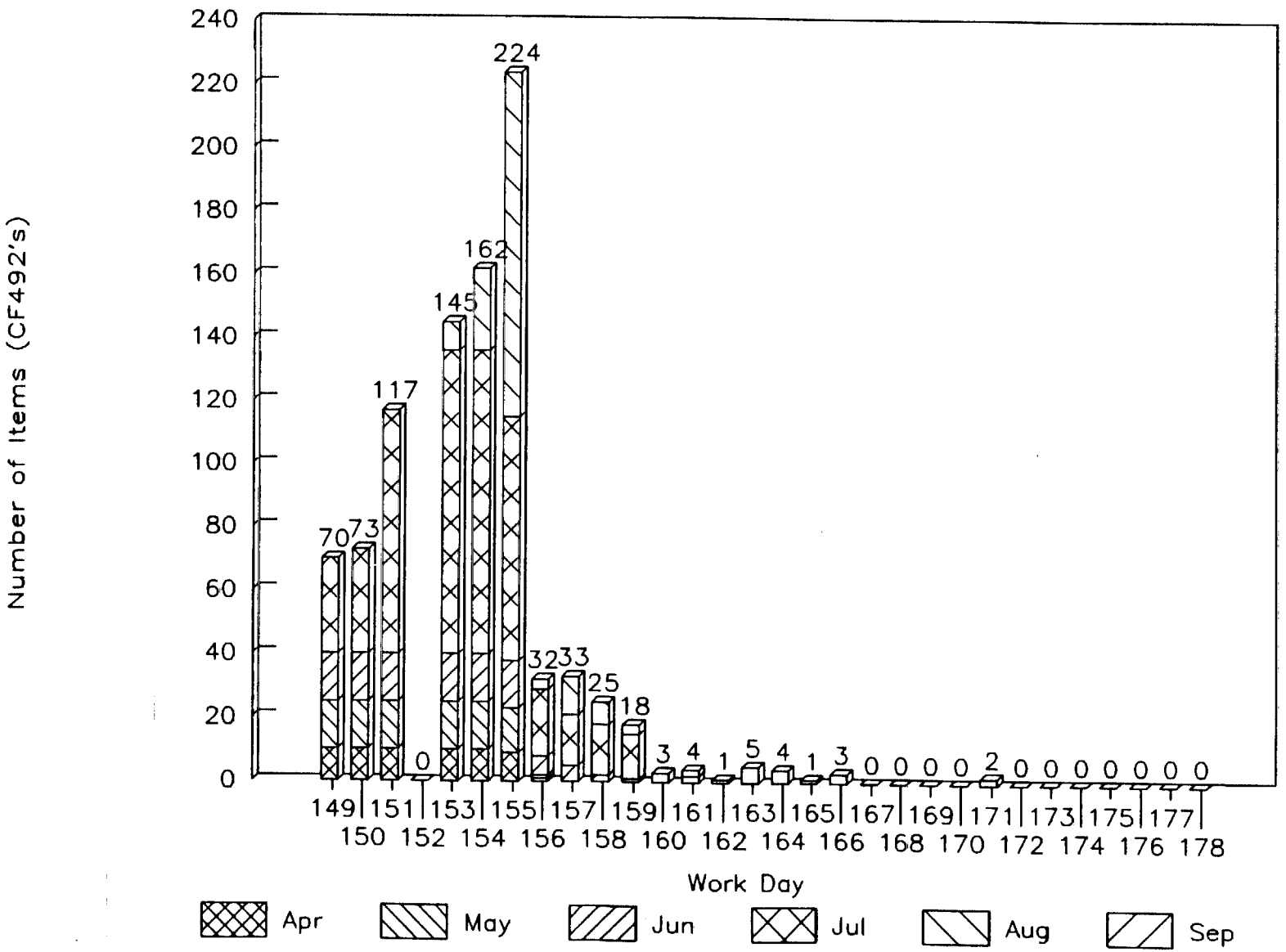
3-DAY TURNAROUND: Initiatives

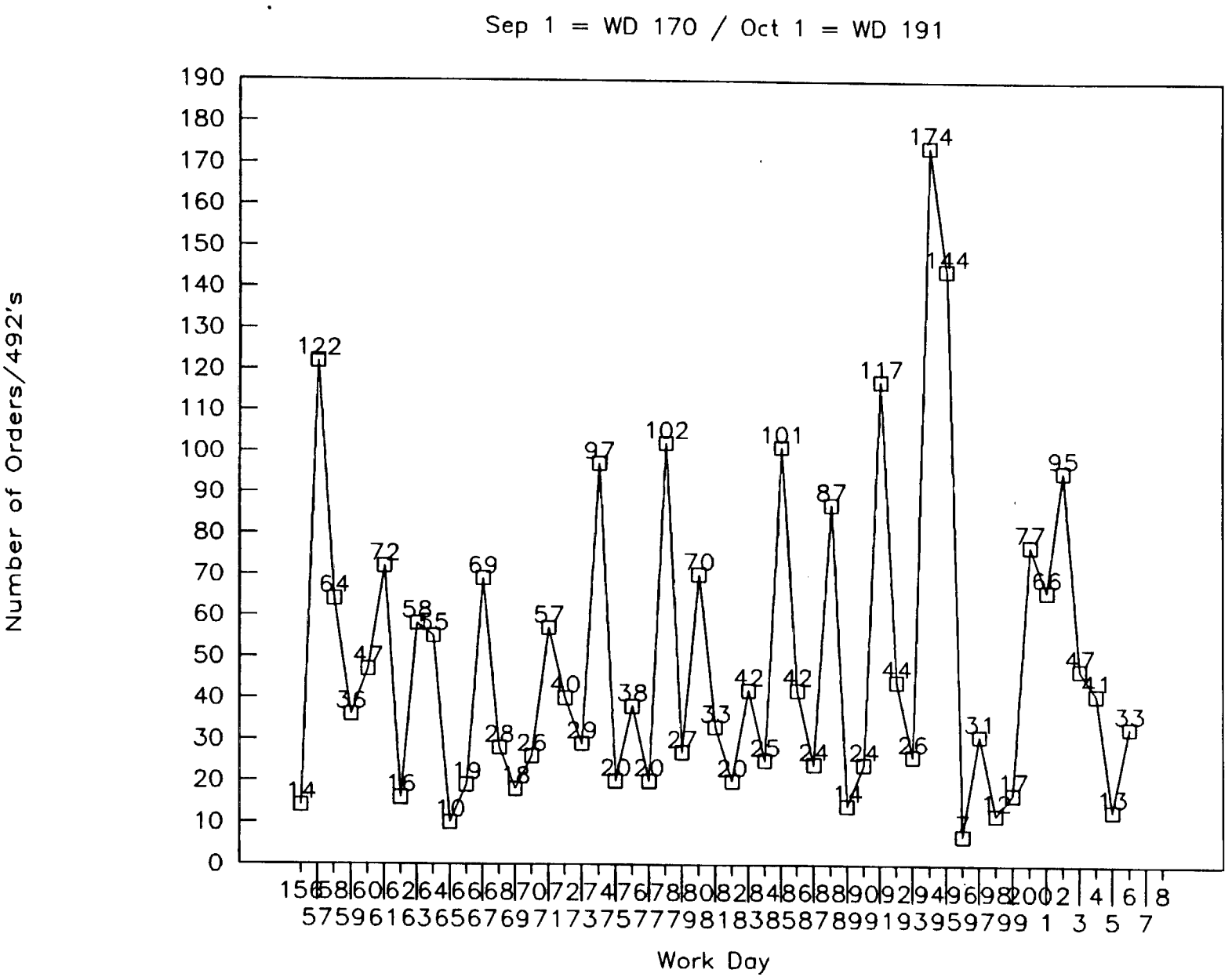
- Action Team
- Division Management Support
- Improve Reporting
- Identify Problems/Barriers
- Track Metrics

NASA TEAM
EXCELLENCE

Document Order Aging/Backlog

8/3=149; 8/31=169; 9/1=170




Sep 1 = WD 170 / Oct 1 = WD 191
Number of Orders/492's
Work Day
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
14
122
64
36
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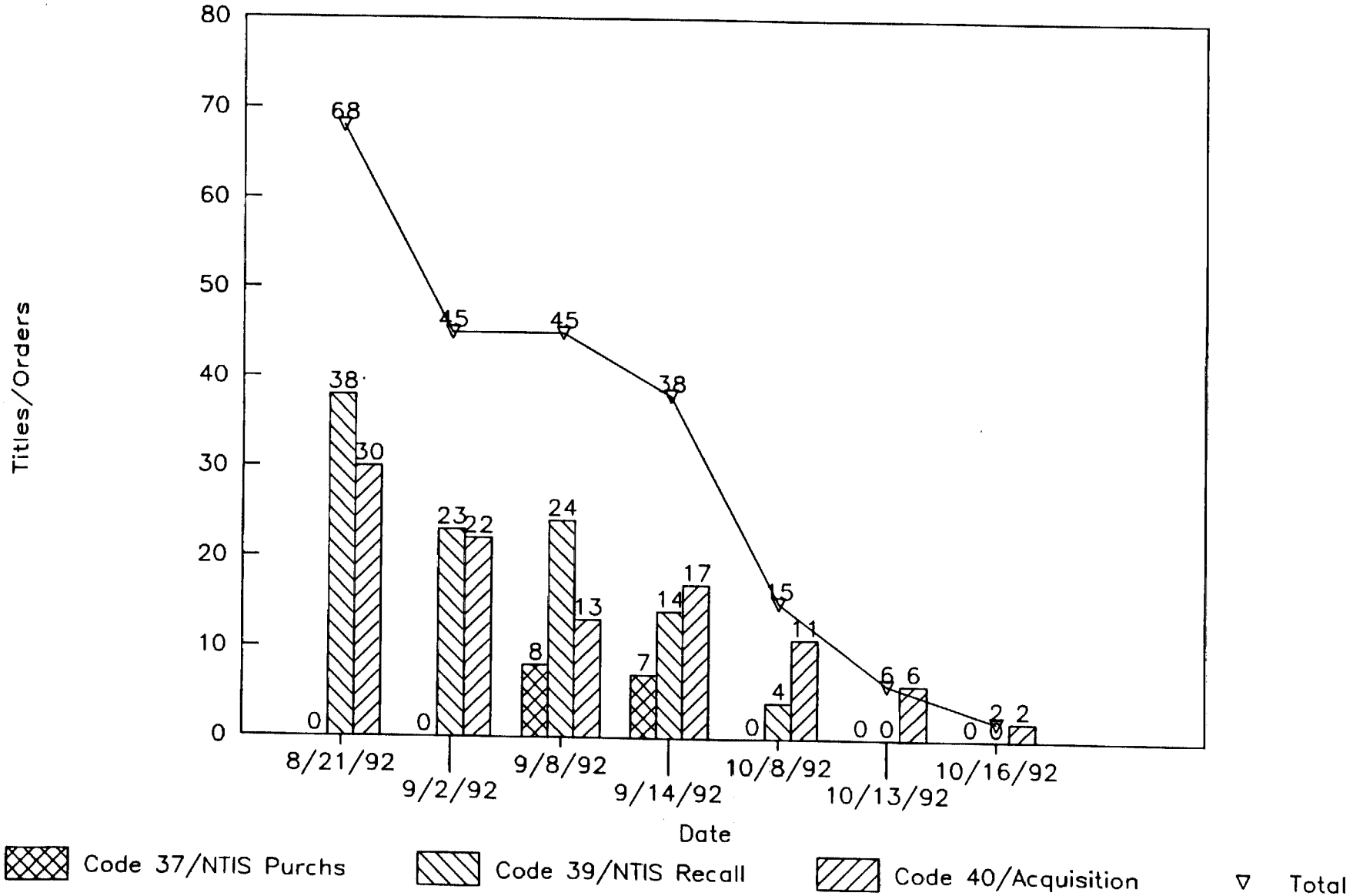
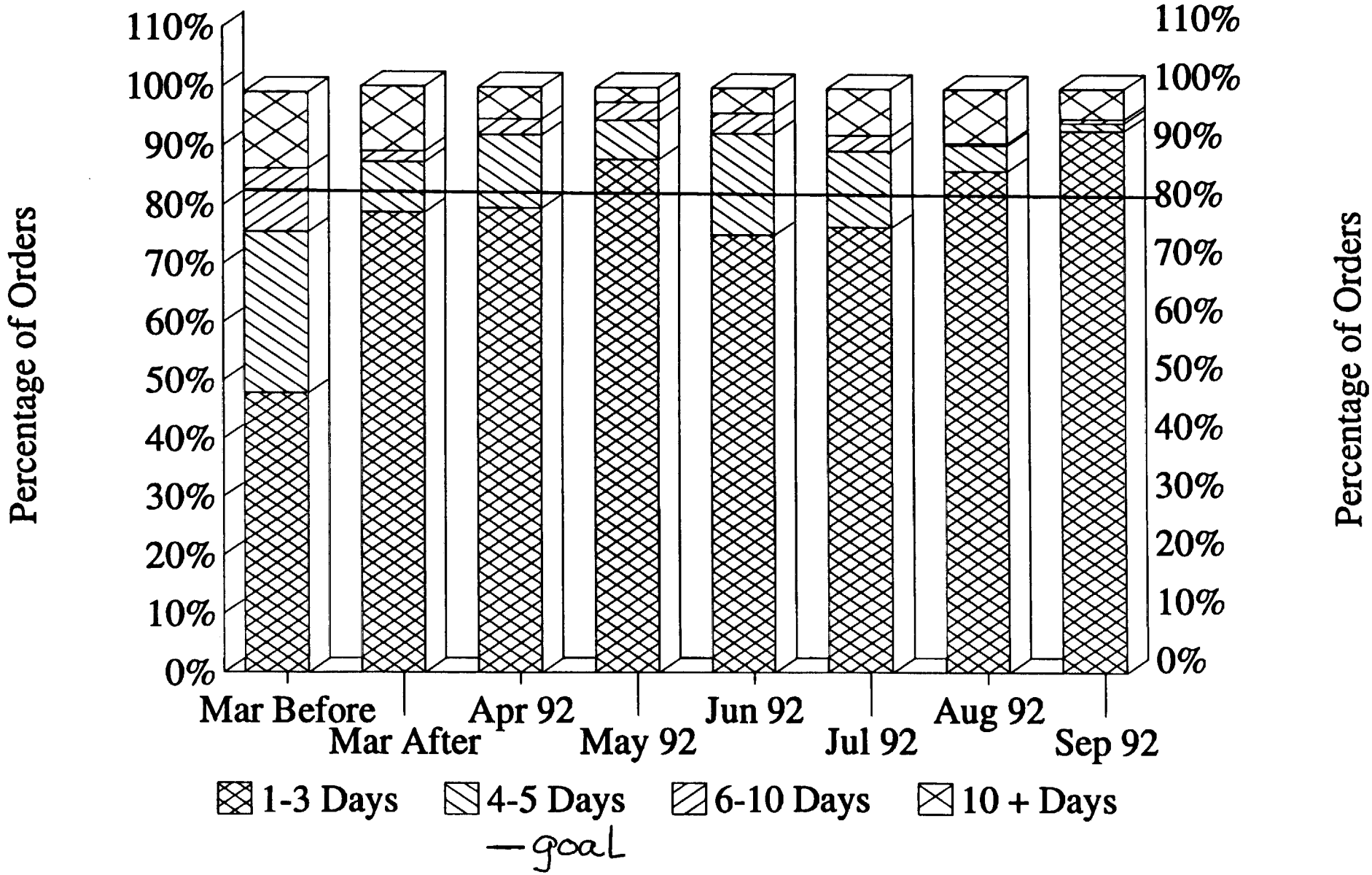
HOLD CODES 37/39/40



Document Orders by Turnaround Time



LESSONS LEARNED

- Training is Essential
- Keep Metrics Simple
- Reward Team and Individual Efforts
- Communication, Communication, Communication
- Quality Improvement is Not the Result of Banners and Speeches, But is the Result of Hard Work.

TOTAL QUALITY AT AIAA

Tony Lenti

NASA STI Coordinating Council

October 28, 1992

TQM at AIAA

- Approach
- Organizational process
- Evolving focus
- Results
- Lessons learned

How we started

- As an approach to:
  - Facilitate continuous improvement
  - Reduce barriers between departments
  - Broaden staff knowledge
  - Solicit more suggestions
- Self Taught
- Treated as a Process
- Low Key, Low Pressure

What is TQM

- Themes
  - Focus on customer satisfaction
  - Organize work as a process
  - Measure results
  - People are key
  - Foster continuous improvement
- Tools
- An engine to set and achieve goals

Team 1

- Representatives of each unit
- Try to limit meetings to 0.5 hr/wk
- Focus on gathering and evaluating suggestions
- Try to answer the question,"why do we do that?"
- Teach teamwork
- Teach problem solving techniques
- Use in-place employee incentive award structure

Team 1 - Problem Solving Techniques

- Problem Solving Techniques
  - Training
  - Lessons learned
  - Decision making at the right level
  - Teamwork
  - Knowledge of organization & objectives
  - Measurement

Team 1 - Results

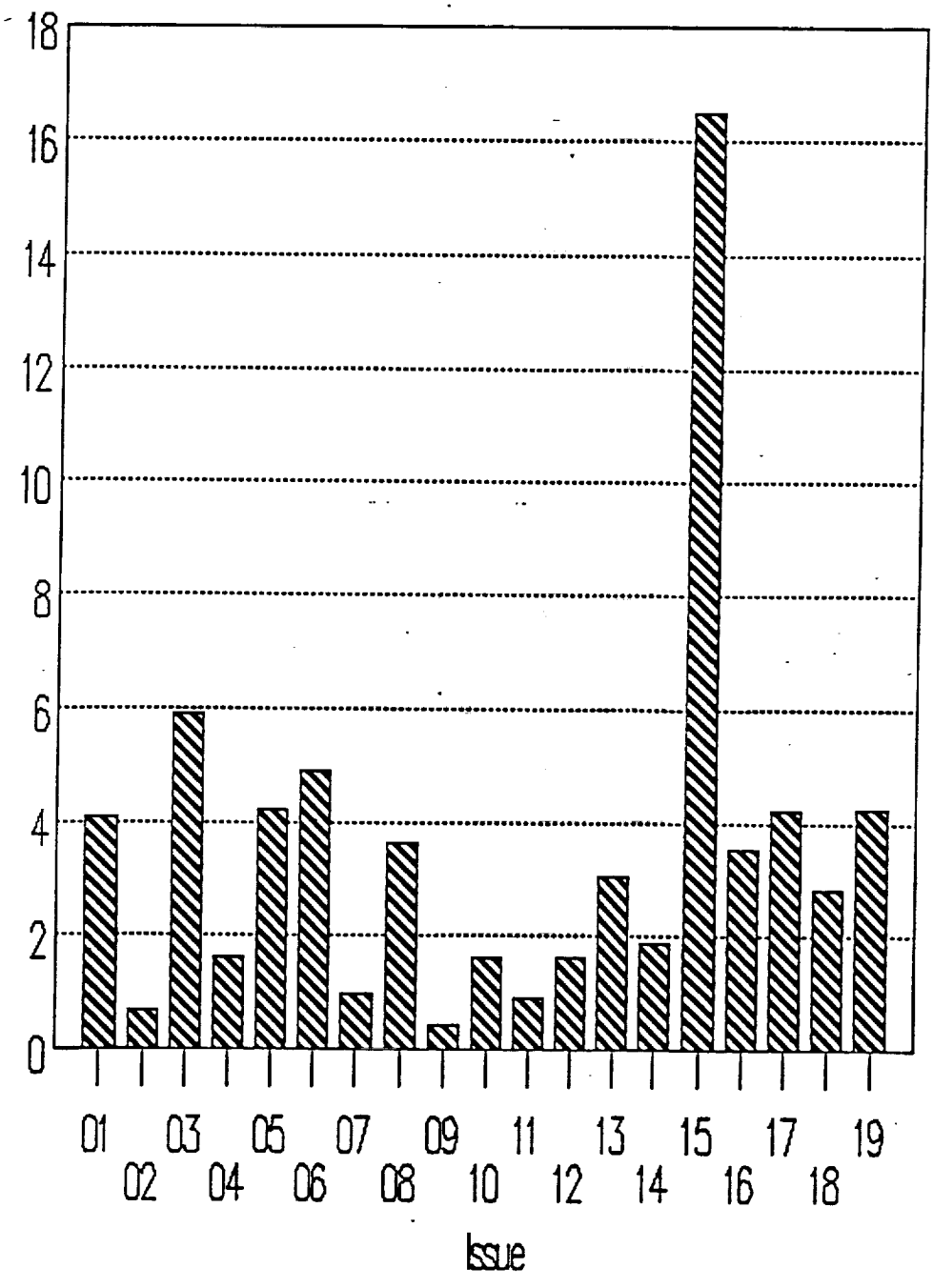
- Staff survey yielded 25 suggestions
- 2/3 implemented
- Measurable $ saved
- Organization awareness
- Change = continuous improvement

Team 2

- Concentrate on Process Analysis
- Flow chart overall production process
- Bottlenecks identified by talking & reviewing chart
- Eliminated steps, moved steps
- Measures tied to processes, and before-after results done for process changes

Errors found reading pages, 1991

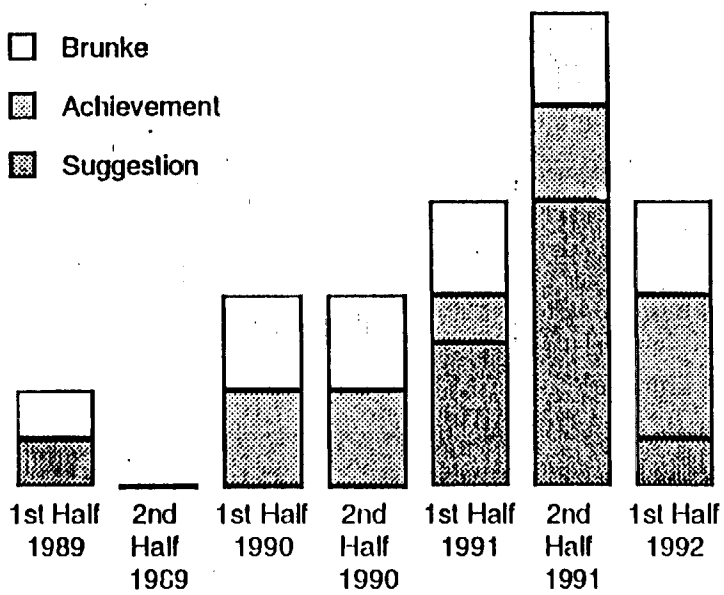
(per 1000 accessions)



Team 2 - Results

- Uncovered staff skills
- Began to develop new measures
- Experimented with charting techniques
- Increase in innovations
- Track measures visibly

Employee Incentive Awards

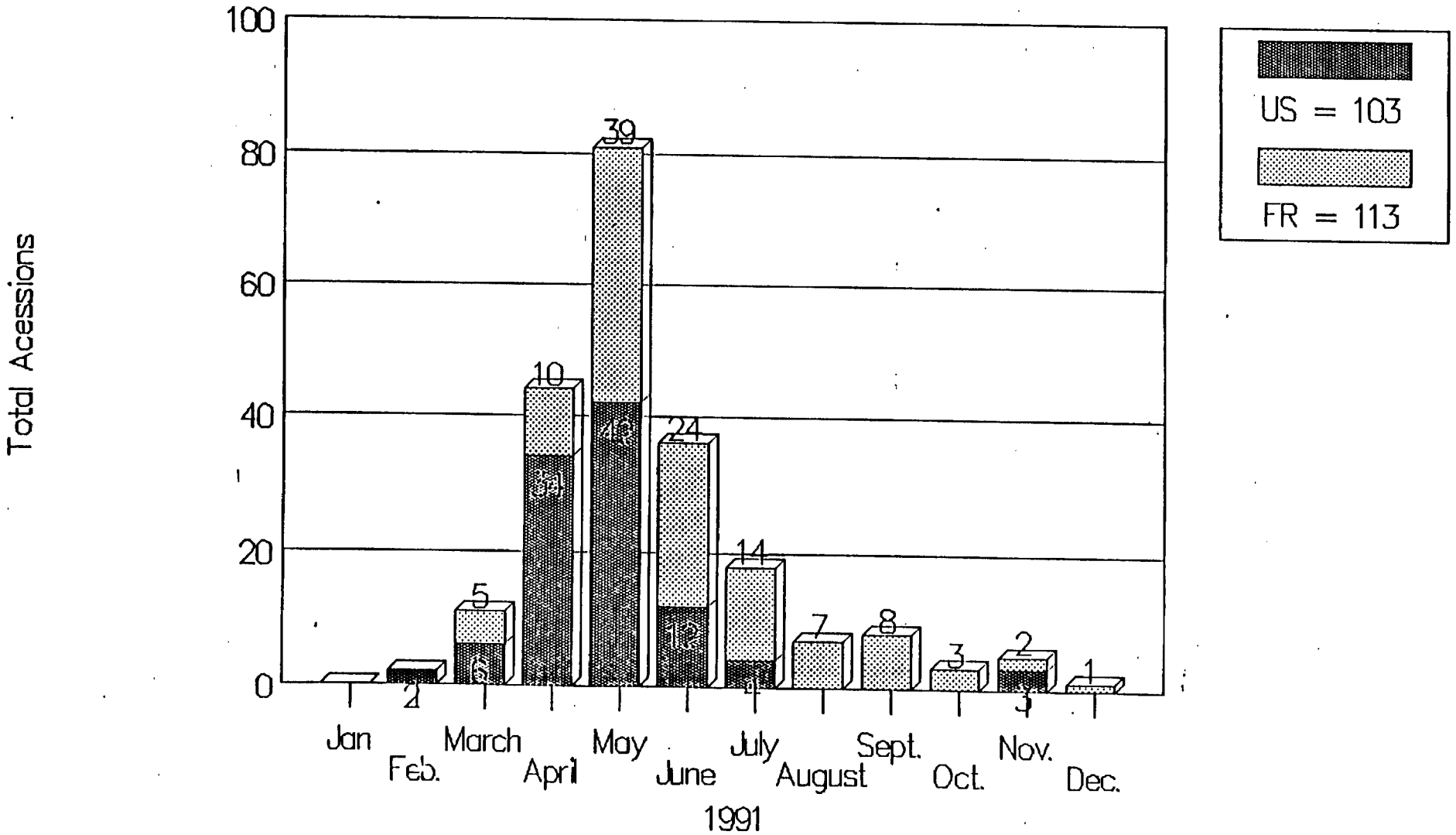


Team 3

- Working on measurement
- Using NASA Quality and Excellence Award as guide
- Turning to customer satisfaction measures
- Process Action Teams are used as separate effort to solve problems

Database Currency (part 1b)

Journals with January 1991 cover dates

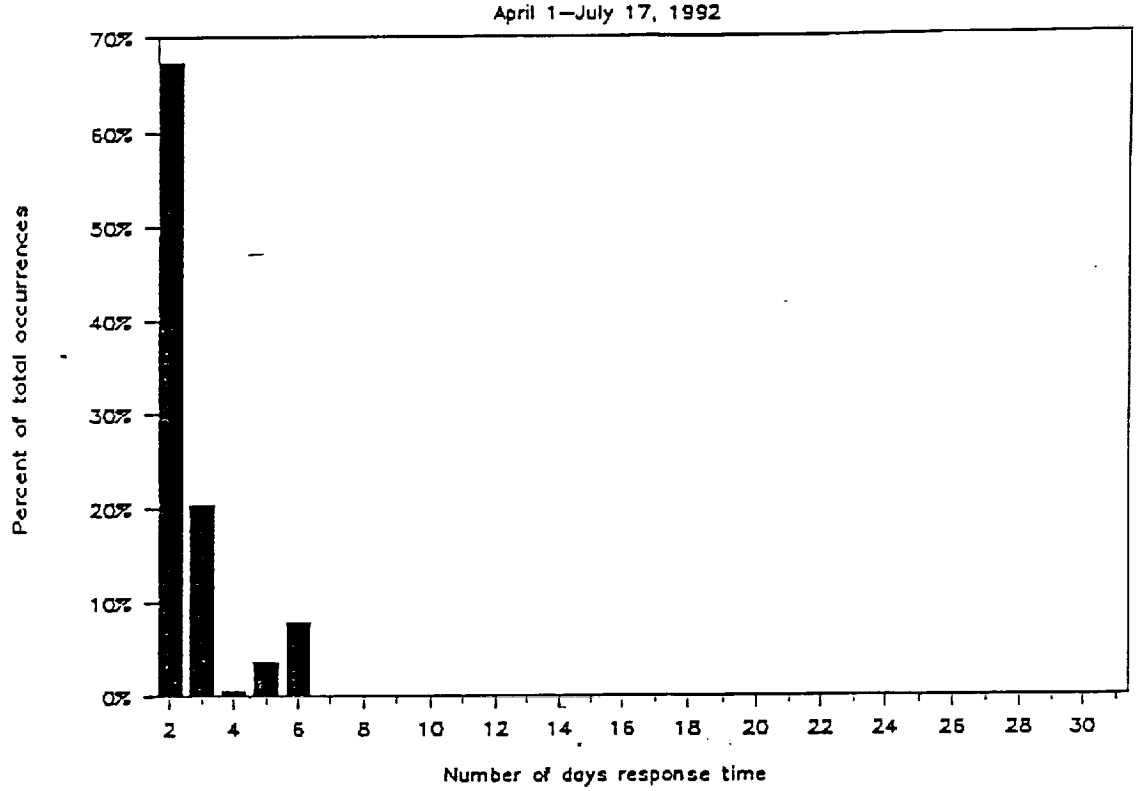


Process Action Teams

- To work specific problems
- Team members unit staff + TQM trained + another outsider
- Use process analysis & measurement
- Proposed solutions presented by whole team to management
- Fixed time table; sometimes a second round

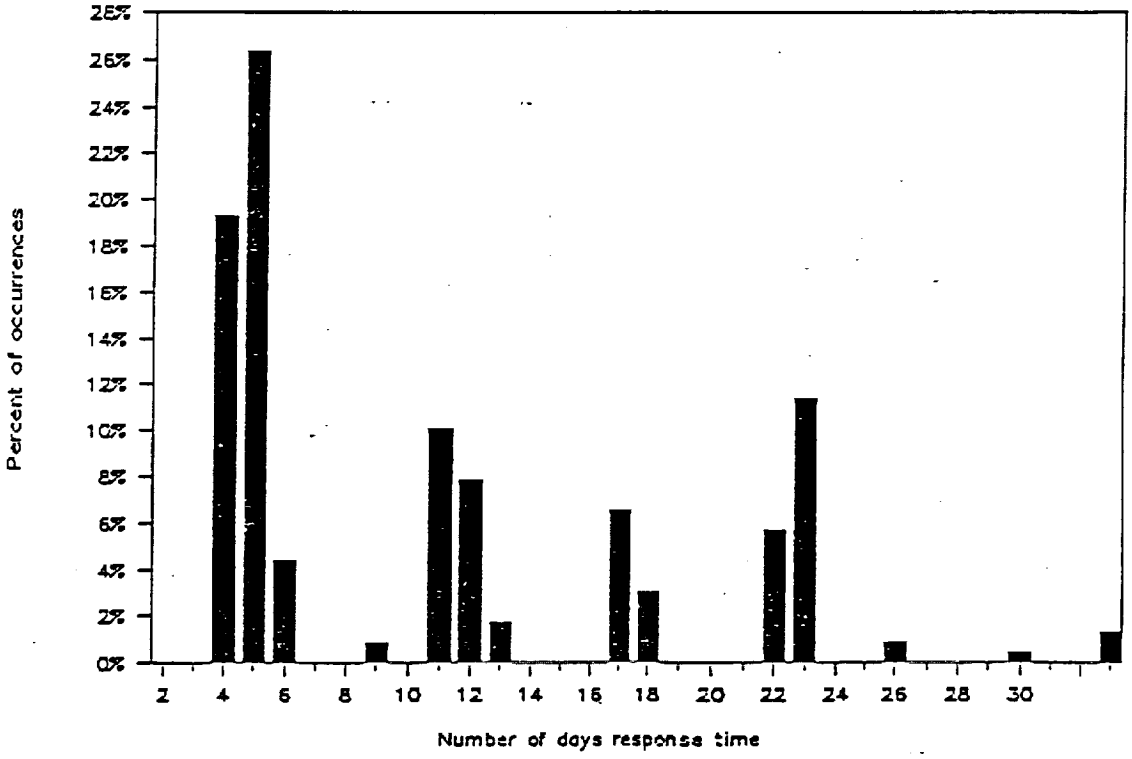
AIAA ILL RESPONSE TIME

April 1—July 17, 1992



AIAA ILL RESPONSE TIME

Jan.—Feb. 1992



Evolution of Teams

- Team 1 = a place to start, suggestion focus
- Team 2 = implement process analysis techniques
- Team 3 = expanding tool set; developing new measures
- Process Action Teams and Working Groups = a normal part of our work style

Evolution of Measurement

- Traditionally measured output units.
- Next measured process events.
- Hardest is to develop customer focused measures.
- Needed the TQM knowledge and staff involvement before turning to customer.

Lessons Learned

- We could obtain results while learning.
- Uncovered staff talents and skills.
- The more management works TQM, the more the results you'll have.
- At some point, formal training would be useful.
- Ultimately will tie more closely to goals, as goals become defined with a user focus.
- Don't need fancy graphics = Do need to share process & results with all staff.

Results

- Almost 50% staff involved to date.
- Suggestions increased to 12/yr from 0-2; 7 winners in 1991.
- 2/3 proposed improvements implemented.
- $ saved.
- Productivity increased 11% 1991.
- Barriers reduced, staff communication improved.
- Staff analytical skills improved.

Conclusion

TQM - a worthwhile stimulus for continuous improvement.

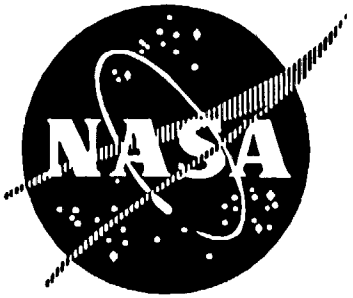
Each employee becomes more valuable as they develop an organization-wide perspective.

The tools of TQM are used every day.

You don't need to be an industrial engineer to join in.

TQM - more than a management trend

TOTAL QUALITY MANAGEMENT



PRESENTATION TO:
STI PROGRAM COORDINATING COUNCIL
OCTOBER 28, 1992

JOSEPH McELWEE
Director
Internal Total Quality Management Division
Office of Continual Improvement

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TOTAL QUALITY MANAGEMENT

INTRODUCTION

- Historical Perspective
- Early Awareness/Implementation Efforts
- New Structural Organization
- Plan for Organizational Transformation
- Senior Management Involvement in Transformation

TOTAL QUALITY MANAGEMENT

AGENCYWIDE HISTORICAL PERSPECTIVE

1992	AA for Continuous Improvement
1992 TQM/CI	CI Council Reconstituted
1992	Senior Management Group Involvement
1991 TQM	NASA-wide TQM Self Assessment
1990	JSC - Quality Improvement Prototype Winner
1990	TQM Colloquia Series Established
1989	LeRC - Quality Improvement Prototype Winner
1987 Q/PI	Quality and Productivity Office
1985	PIQE Office Established
1982 PIQE	Productivity Improvement and Quality Enhancement (PIQE) Program Established

T. 12116 (MC)

TOTAL QUALITY MANAGEMENT

TQM SELF ASSESSMENT

FEB 1990	TQM Self Assessment Distributed
NOV 1990	Self Assessment Data Compiled
JAN 1991	Administrator Briefed on Results Internal TQM Review Initiated
FEB-MAR 1991	Internal TQM Review Team Trained
JUL-OCT 1991	Internal TQM Review Site Visits
NOV 1991	Administrator Briefed on Results

TOTAL QUALITY MANAGEMENT

EARLY EFFORTS

- Built Awareness and Commitment
- Engaged All Sites (HQ/Centers)
- Permitted Autonomy and Flexibility
- Encouraged Sharing Across Agency
  - Best Practices
  - Lessons Learned

TOTAL QUALITY MANAGEMENT

WHERE ARE WE TODAY?

- Field Centers Generally Ahead of Headquarters
- Senior Management Engaged/Involved in Planning/Implementation
- Education and Training Underway (Approaches Vary)
- Some Centers - Many Teams Underway
  - Some Early Results

TOTAL QUALITY MANAGEMENT

HEADQUARTERS

- Continuous Improvement Council
- Cross-Functional Process Action Teams
  - Early Results
- Education and Training
  - Awareness
  - Process Action Team
  - Facilitation
  - Benchmarking

TOTAL QUALITY MANAGEMENT

BUT...

- Still Limited Comprehension of TQM and CI
- Spotty Implementation
- Top Management Not Yet Functioning as a Team
- Failure To Recognize Customer/Stakeholder/Contractor Relationships
- Not Satisfied With Supplier Quality
- Not Satisfying Customers/Stakeholders
- No Overall Plan Exists

TOTAL QUALITY MANAGEMENT

WHAT ARE WE GOING TO DO?

Office of Continuous Improvement Created June 1992

- New Associate Administrator for Continuous Improvement, Dr. Laurie A. Broedling, Appointed in June, 1992

- Chartered To:
  - Provide Agency-wide Executive Leadership for the Development and Management of Agency-wide TQM Policy, Plans, and Programs
  - Provide Direction/Guidance in Developing Measures for Continuous Improvement
  - Provide Information and Develop Communication Vehicles Among Internal and External Suppliers, Stakeholders, and Customers

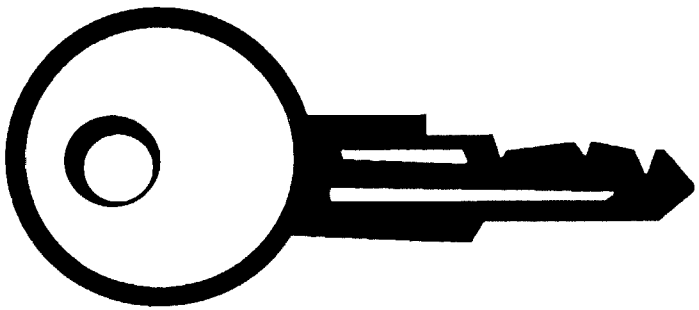
TOTAL QUALITY MANAGEMENT

INTERNAL TQM DIVISION MAJOR INITIATIVES

- Planning/Implementation Support
- TQM Infrastructure Support
  - Continuous Improvement Council
  - Quality Steering Team
- Education and Training
  - Senior Management
  - Headquarters
    - -- Metrics
    - -- Tools & Techniques
- TQM Colloquia Series
- TQM Focal Point Network
- Agency Coordination Role

TOTAL QUALITY MANAGEMENT

DEVELOP NASA-WIDE PLAN FOR



ORGANIZATIONAL TRANSFORMATION

TOTAL QUALITY MANAGEMENT

HISTORICAL PERSPECTIVE

Not Starting from a Blank Sheet of Paper

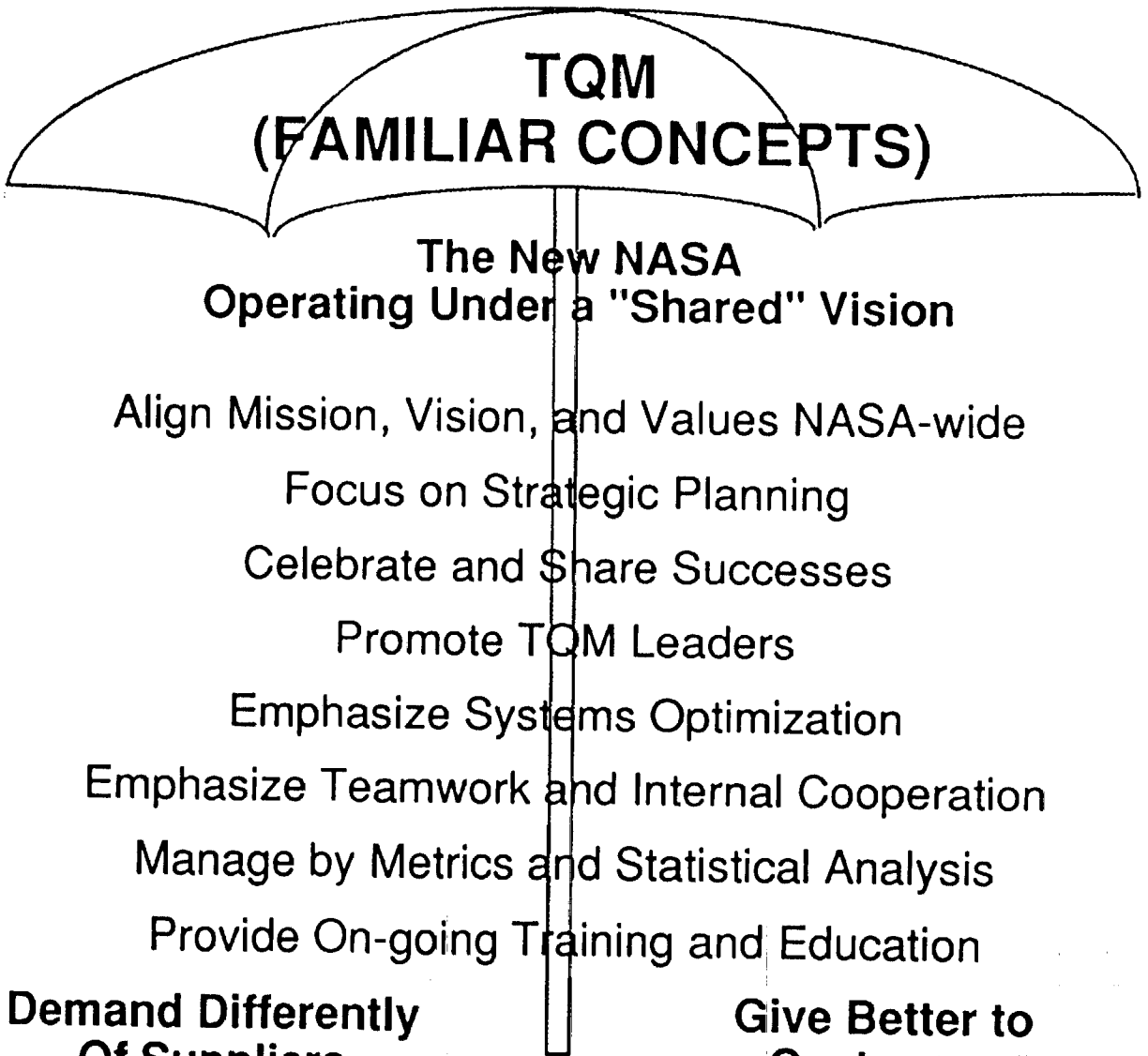
- Ten Year History of Productivity and Quality at NASA
- More Progress at Field Centers than at Headquarters
- New Initiative Must Accommodate History (Both Good and Bad)
- Build on Strengths and Weaknesses

TOTAL QUALITY MANAGEMENT

ORGANIZATIONAL TRANSFORMATION PLANNING APPROACH

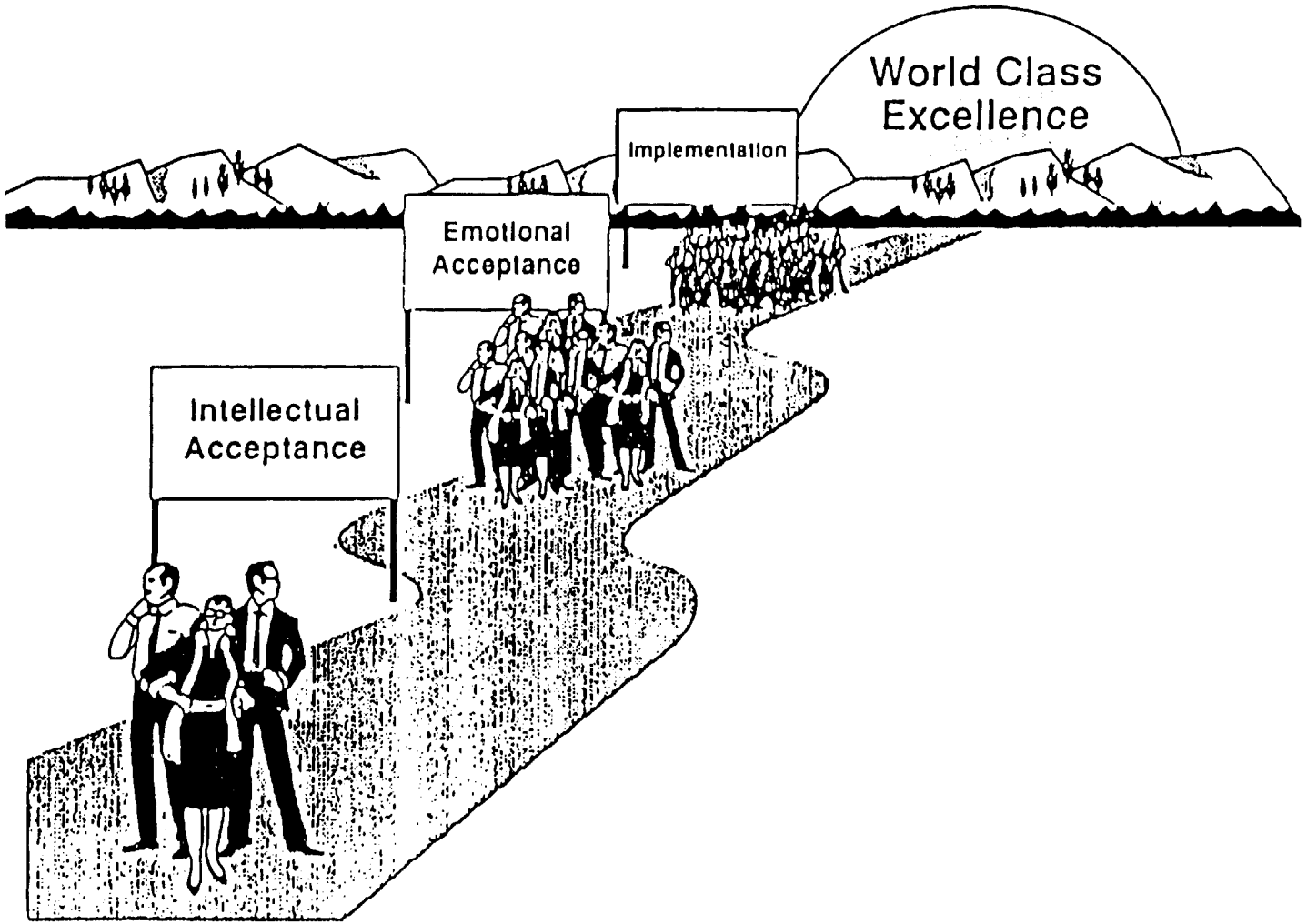
- Briefed to Administrator
- Briefed to Associate/Assistant Administrators
- Briefed to Center Directors
- Briefed to TQM Focal Points

TOTAL QUALITY MANAGEMENT



TOTAL QUALITY MANAGEMENT

GOAL: ACHIEVE A CRITICAL MASS



T. 12116 (MC)

TOTAL QUALITY MANAGEMENT

GOAL OF THE NASA-WIDE PLAN

ACHIEVE A CRITICAL MASS WITHIN 3 YEARS

CRITICAL MASS

- Webster's Definition
  - That which is of a sufficient size to sustain a chain reaction

- NASA's Definition
  - A sufficient number of committed and influential people to sustain the organizational transformation process

TOTAL QUALITY MANAGEMENT

NASA-WIDE PLAN FRAMEWORK

Use Baldrige Criteria as a Blueprint

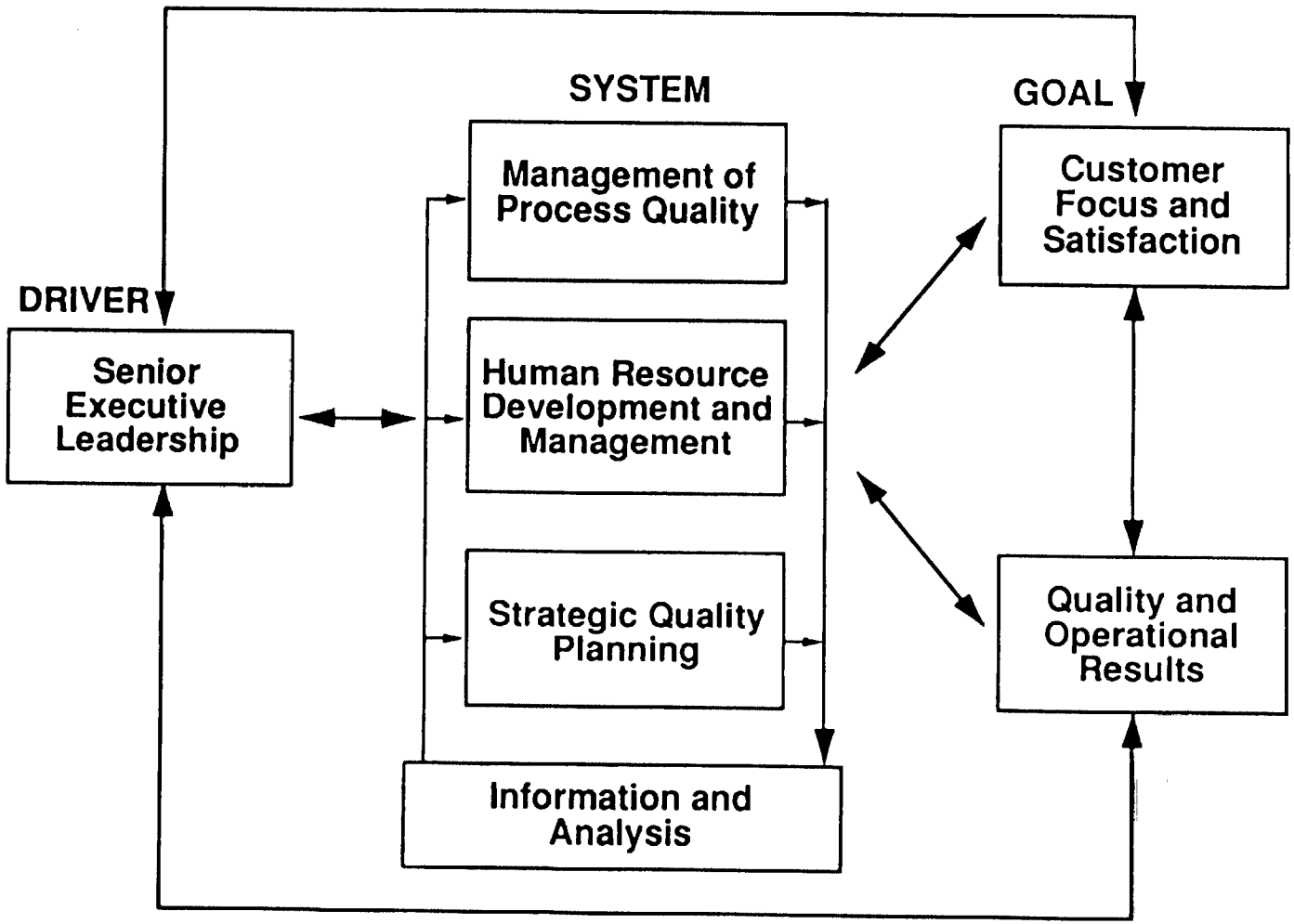
Rationale:

- Recognized as a National Standard
- Integrates TQM and Business Strategic Plans
- Emphasizes Continuous Process Improvement
- Supported by a Base of Consultants and Training Programs
- Converts Easily to Presidential Award Criteria for Competitive Purposes

TOTAL QUALITY MANAGEMENT

BALDRIGE AWARD CRITERIA

Framework for Transformation



TOTAL QUALITY MANAGEMENT

COMPONENTS OF THE FRAMEWORK

- Leadership
  - Senior Management Personal Involvement and Visibility
- Information and Analysis
  - Measurement
- Strategic Quality Planning
  - Quality Planning Linked to Strategic Planning
  - Systems View
  - Requirements Communicated to Contractors
- Human Resource Development and Management
  - Enabling
  - Empowerment
  - Teamwork
  - Training
  - Recognition

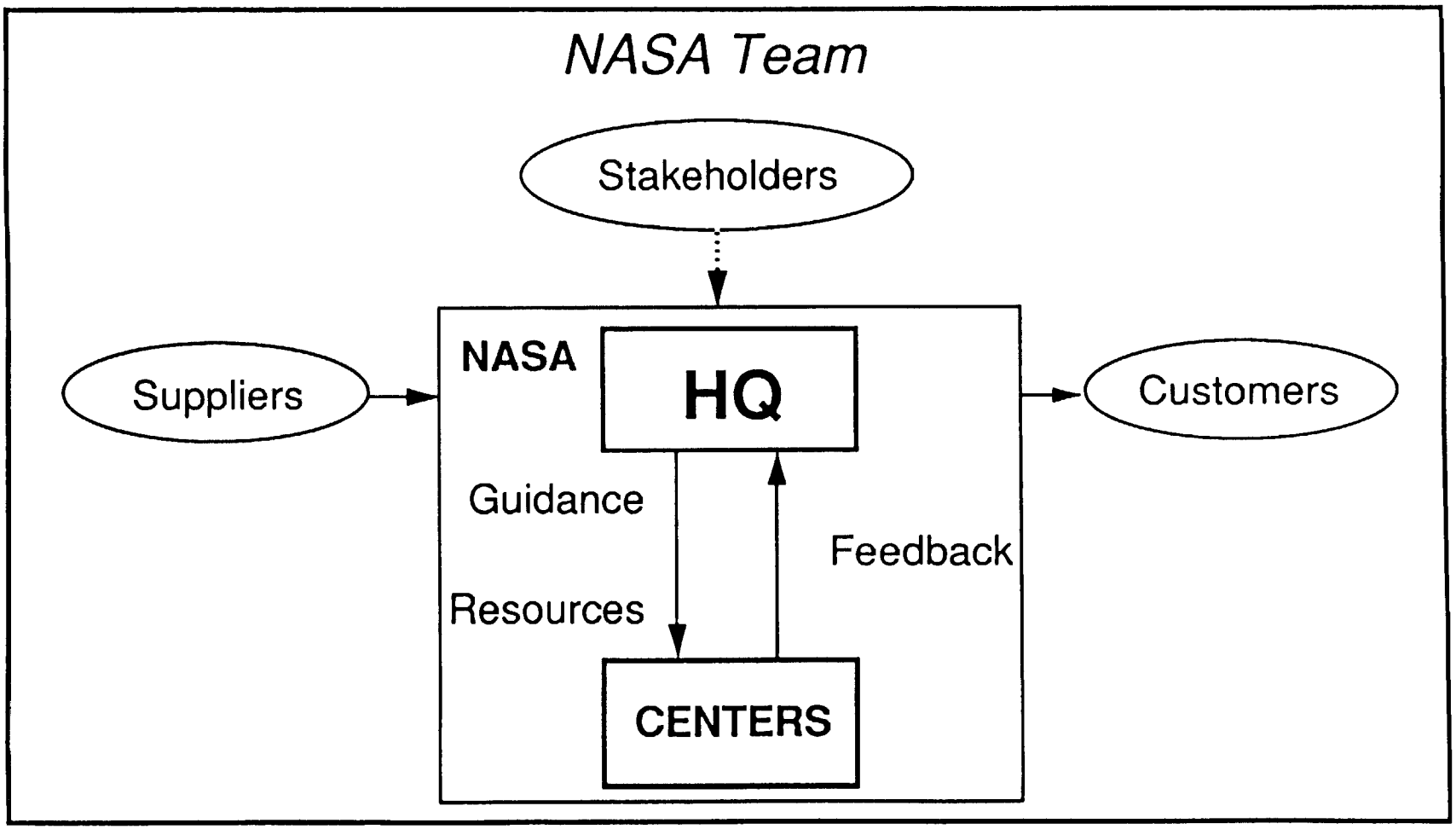
TOTAL QUALITY MANAGEMENT

COMPONENTS OF THE FRAMEWORK

- Management of Process Quality
  - Continuous Process Improvement
  - Strategy and Action to Improve Quality and Responsiveness (Internal and External)
  - Mechanisms to Assure that Quality Goals are Met (Internal and External)
- Quality and Operational Results
  - Quicker, Better, Cheaper - Without Compromising Safety
  - Contractor Performance - Key Indicator Trends
- Customer Focus and Satisfaction
  - Internal and External

TOTAL QUALITY MANAGEMENT

SCOPE
NASA-WIDE PLAN



TOTAL QUALITY MANAGEMENT

NASA-WIDE PLAN IMPLEMENTATION

Master Plan - Developed and Executed by Quality Steering Team

- Multiple Components
  - NASA Headquarters
    -- Steered by Continuous Improvement Council
  - Field Centers
    -- Steered Locally with Guidance from Quality Steering Team
- Customer Relationships
- Contractor Relationships
  - More Than 80% of NASA Budget Allocated to Contractors

TOTAL QUALITY MANAGEMENT

NASA-WIDE PLAN IMPLEMENTATION

First Step: Establish Quality Steering Team

Charter:

- Guide the NASA Organizational Transformation
  - Develop/Review/Approve Master Plan
  - Provide Leadership and Policy Guidance
- Integrate Business and Strategic Planning

TOTAL QUALITY MANAGEMENT

NASA-WIDE PLAN IMPLEMENTATION

Quality Steering Team Composition

- Permanent Members
  - Administrator, Chair
  - Deputy Administrator
  - Chief-of-Staff
  - AA/Human Resources
  - AA/Continuous Improvement (Executive Secretary)
- Rotating Members
  - Associate Administrators
    - from Program Codes
    - from Policy Codes
  - Center Directors

TOTAL QUALITY MANAGEMENT

NASA-WIDE PLAN IMPLEMENTATION

Quality Steering Team - Operating Principles:

- The Steering Team will Operate in Accordance with TQM Principles
- No Substitutes will be Allowed
- Rotating Members Serve 1-Year Terms
- Meetings Held in Conjunction with Senior Management Group Meetings
- Any Other Senior Management Group Members Can Sit-In (Non-Voting)

TOTAL QUALITY MANAGEMENT

SENIOR MANAGEMENT EDUCATION AND TRAINING

- CPI Boot Camp
- Deming Session
- Covey Leadership Seminar

TOTAL QUALITY MANAGEMENT

Transformation is required in government, industry, education. Management is in a stable state. Transformation is required to move out of the present state. The transformation required will be a change of state, metamorphosis, not mere patchwork on the present system of management. We must of course solve problems and stamp out fires as they occur, but these activities do not change the system.

W. Edwards Deming

"Foundation for Management of Quality in the Western World"

October 10, 1989

PRESENTATION TO NASA

BY

PATENT & TRADEMARK OFFICE

OFFICE OF NATIONAL AND

INTERNATIONAL APPLICATION REVIEW

Anne Kelly, Director,
Office of National and International
Application Review

Ronald Adams, Manager
Application Processing Division

October 28, 1992

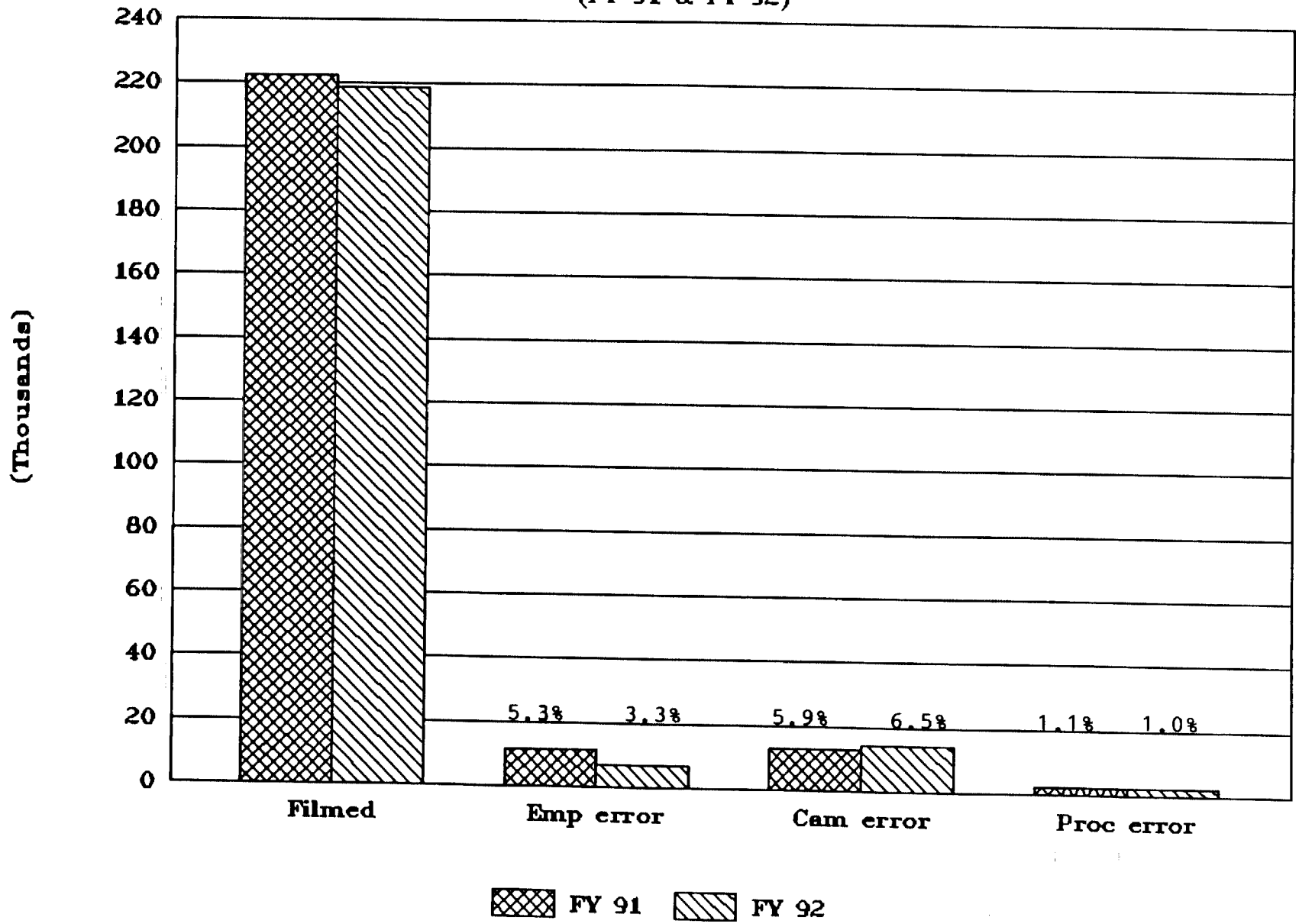
MEASURABLE PROCESS IMPROVEMENTS

OFFICE OF NATIONAL AND INTERNATIONAL APPLICATION REVIEW

	FY 88	FY 89	FY 90	FY 91	FY 92
Applications Released	148,491	166,321	175,645	175,307	176,515
Mail Filing Receipts	37	20	18	18	17
Days to Release Applications	60	28	25	24	24
Camera Operator Quality	----	----	92%	95%	97%
Processing & Camera Quality	----	----	----	93%	92.5%
Customer Correction Quality	85%	90%	97%	97.6%	97.2%

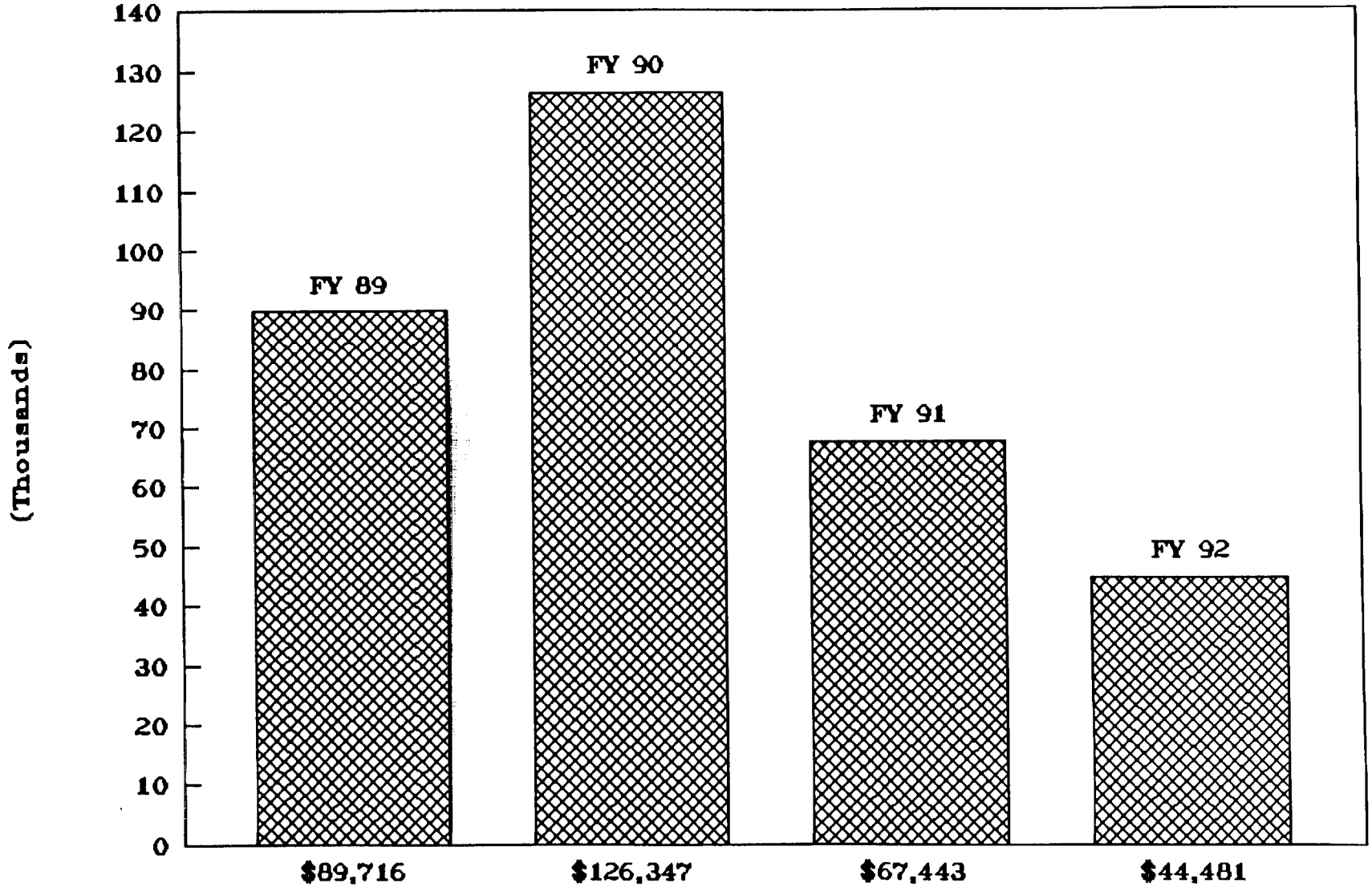
EMPLOYEE ERROR RATES

(FY 91 & FY 92)



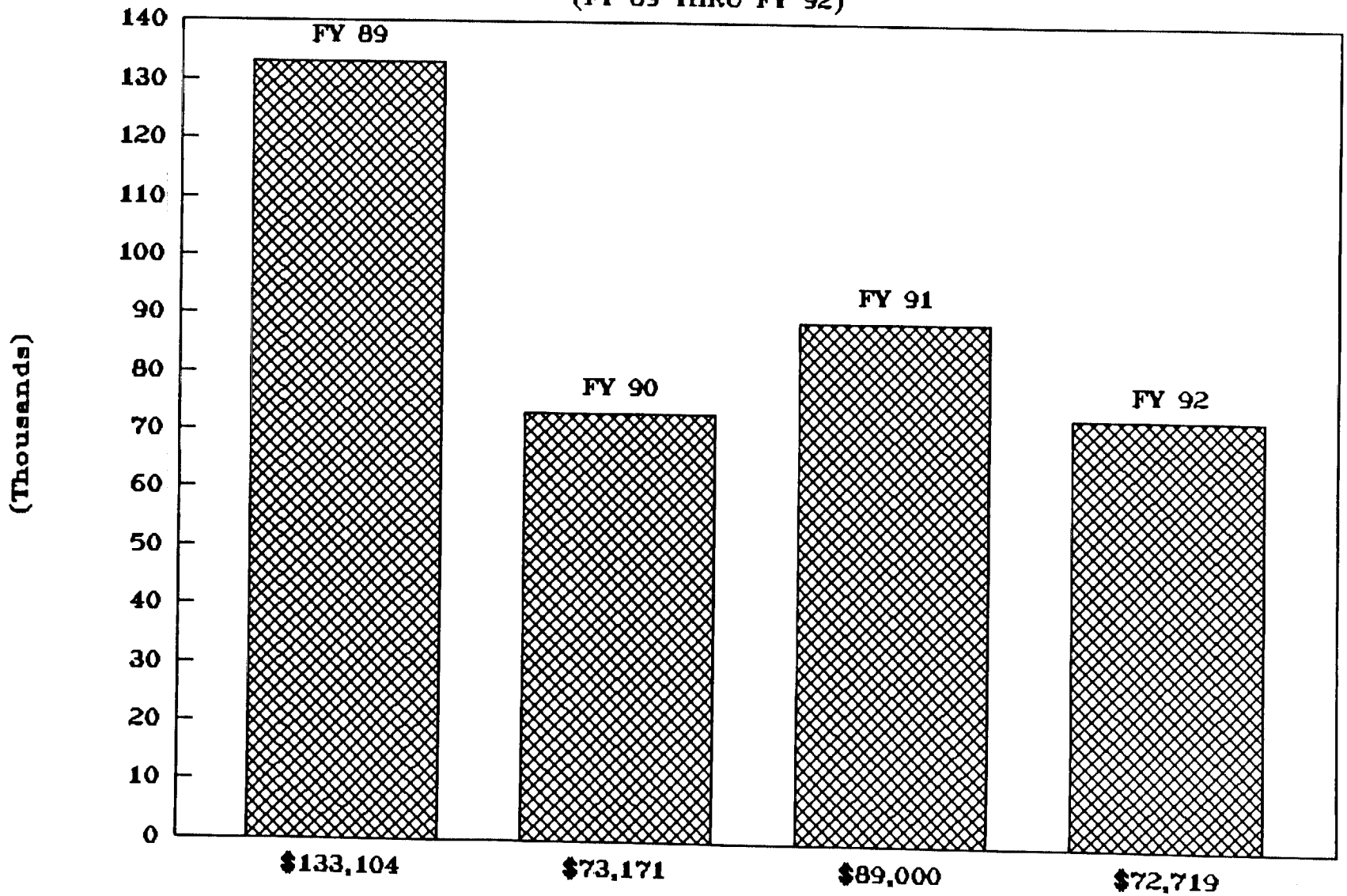
OVERTIME

(FY 89 THRU FY 92)



SUPPLY COSTS

(FY 89 THRU FY 92)

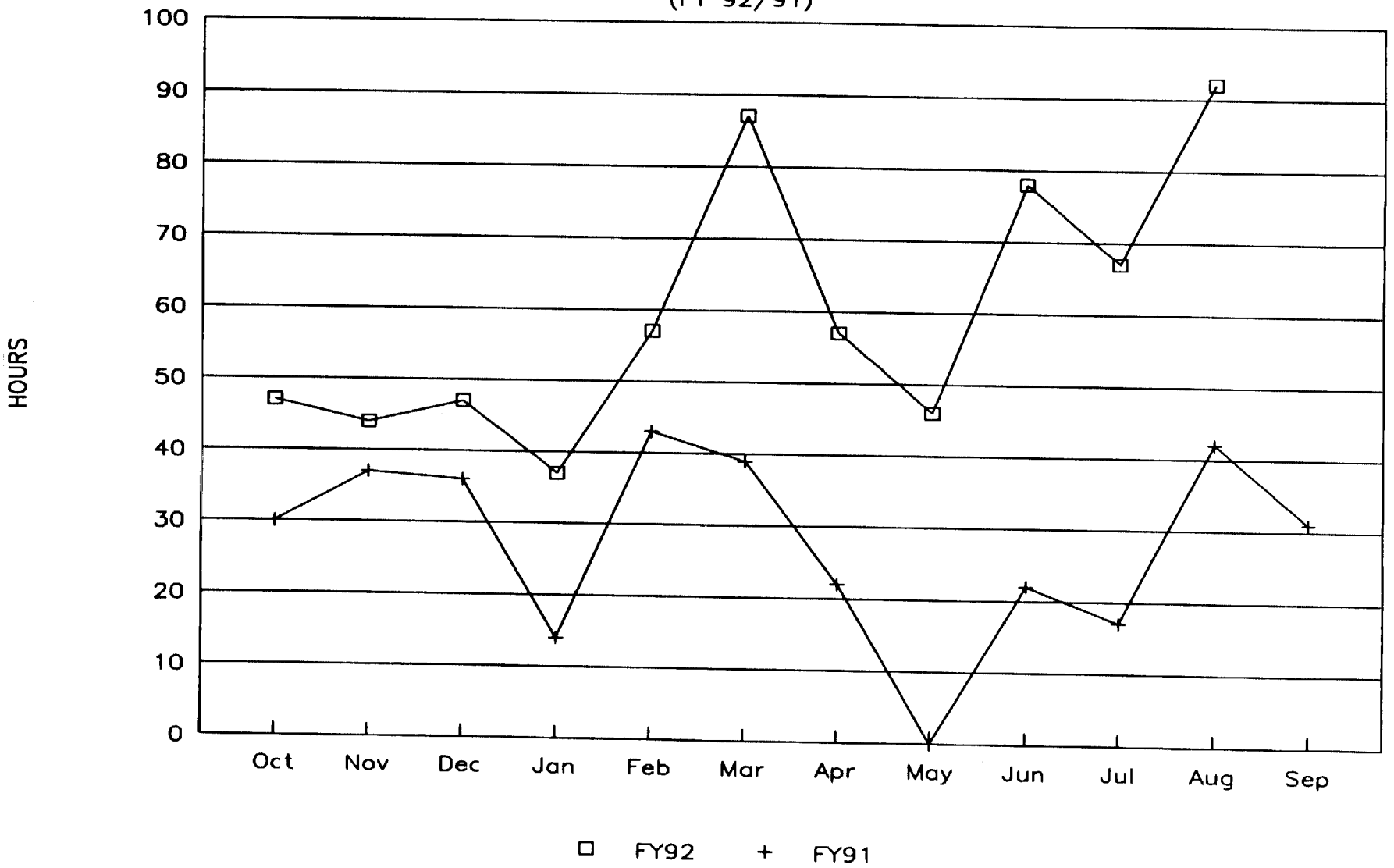


WEEK 4 SEPTEMBER 20TH THRU SEPTEMBER 26TH, 1992

Employee Name	App's Filmed	Operator Error	Camera Error	Process Error	% Emplo Error	% Camera Error	% Process Error
	287	3	9	1	1.0	3.1	0.3
	203	2	7		1.0	3.4	0.0
	374	2	10	4	0.5	2.7	1.1
	197	5	15	4	2.5	7.6	2.0
	324	1	14	35	0.3	4.3	10.8
	54				0.0	0.0	0.0
	312	2	.8		0.6	2.6	0.0
	170	4	32	1	2.4	18.8	0.6
	152	7	2	1	4.6	1.3	0.7
	281	5	11		1.8	3.9	0.0
	219	9	10	7	4.1	4.6	3.2
	303				0.0	0.0	0.0
	178		1	1	0.0	0.6	0.6
	161	2	14		1.2	8.7	0.0
	100			1	0.0	0.0	1.0
	332	1	11	1	0.3	3.3	0.3
	201	6	21	2	3.0	10.4	1.0
	292	5	1	2	1.7	0.3	0.7
	229	1		100	0.4	0.0	43.7
	201	3			1.5	0.0	0.0
TOTAL	4570	58	166	160	1.3	3.6	3.5

UNION HOURS

(FY 92/91)



MICROGRAPHICS DIVISION CUSTOMERS

The Micrographics Division is responsible for microfilming over 200,000 patent applications, 13,000 PCT applications and over 400 patent/trademarks reels. This amounts to approximately 11 million images (pages) filmed per year.

The following is a listing of Micrographics Division Customers:

Assignment/Certification Services Div (Provide with 105mm fiche)

Maintenance Fee Division: (Provide microfilm and duplicates)

Assignment Search Area: (Provide 16mm microfilm)

License and Review (L&R): (Provide 5 duplicate copies of all 105mm L&R microfiche)

Trademark Search Library: (Provide 16mm microfilm for public)

Office of Enrollment and Discipline: (Process or duplicate film)

Office of Finance: (Process their 16mm film)

International Division (PCT): (Film all PCT Applications)

Office of Trademark Ser.: (Process and duplicate their 16mm film)

All Patent Examining Groups: (Provide with Patent Application)

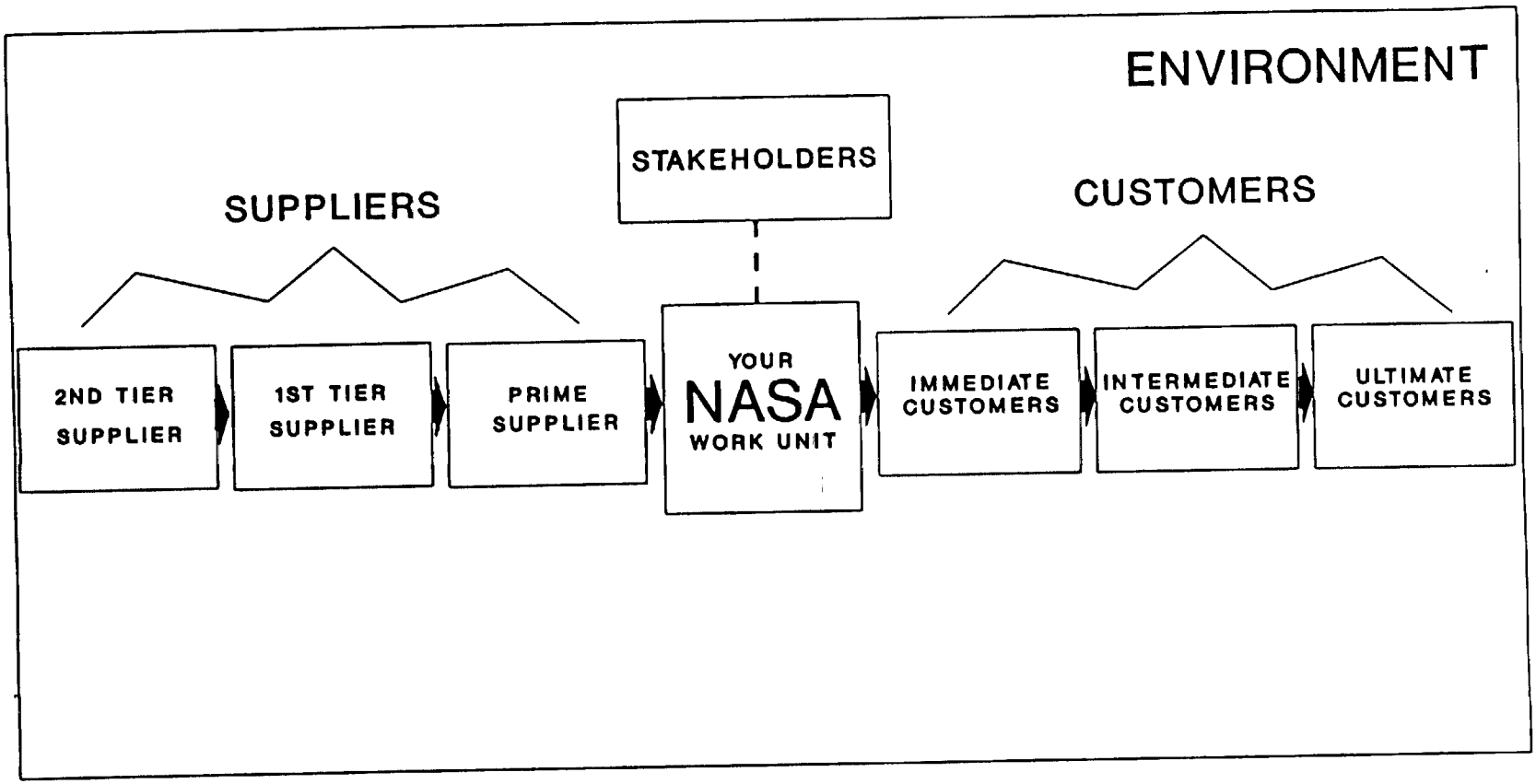
Federal Storage Center Boyers, Pa: (Sent master copies of 105mm microfiche for storage)

National Technical Information Service (NTIS):
Springfield, Virginia: (Make duplicates microfilm of TM Registers)

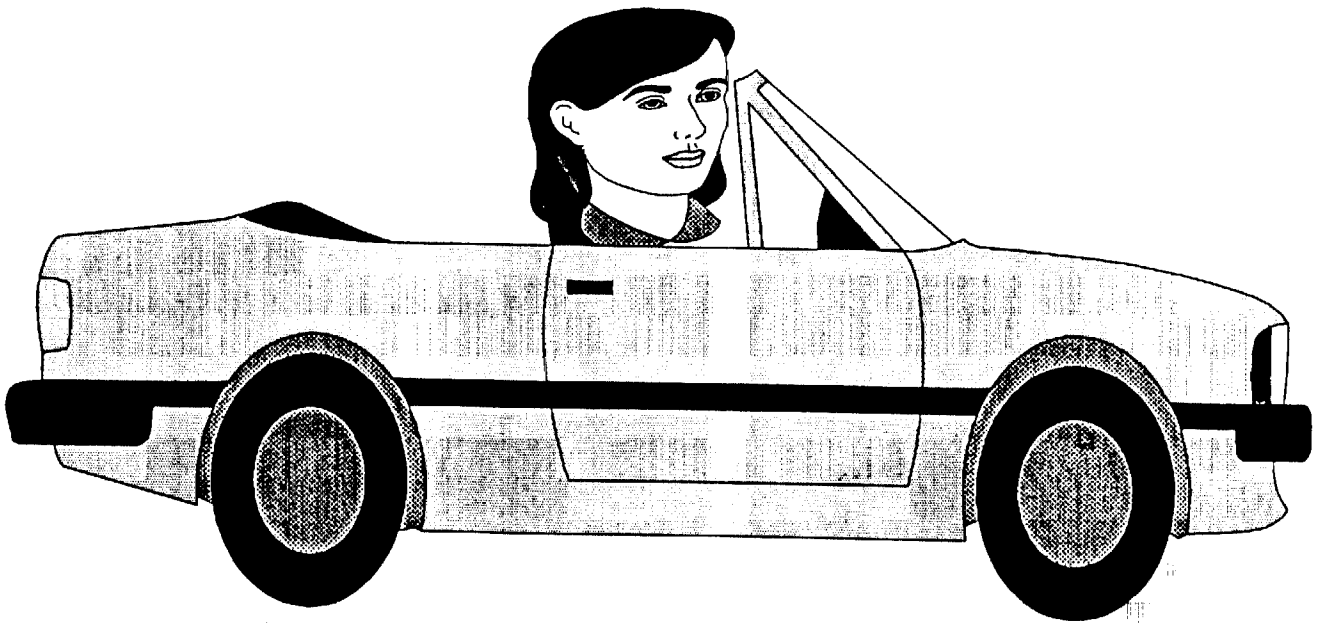
Over the past two years, the Micrographics Division has progressed to a class "A" micrographics operation. We have the latest in camera technology, quality inspection equipment and film processing equipment is state-of-the-art.

A Customer is.....

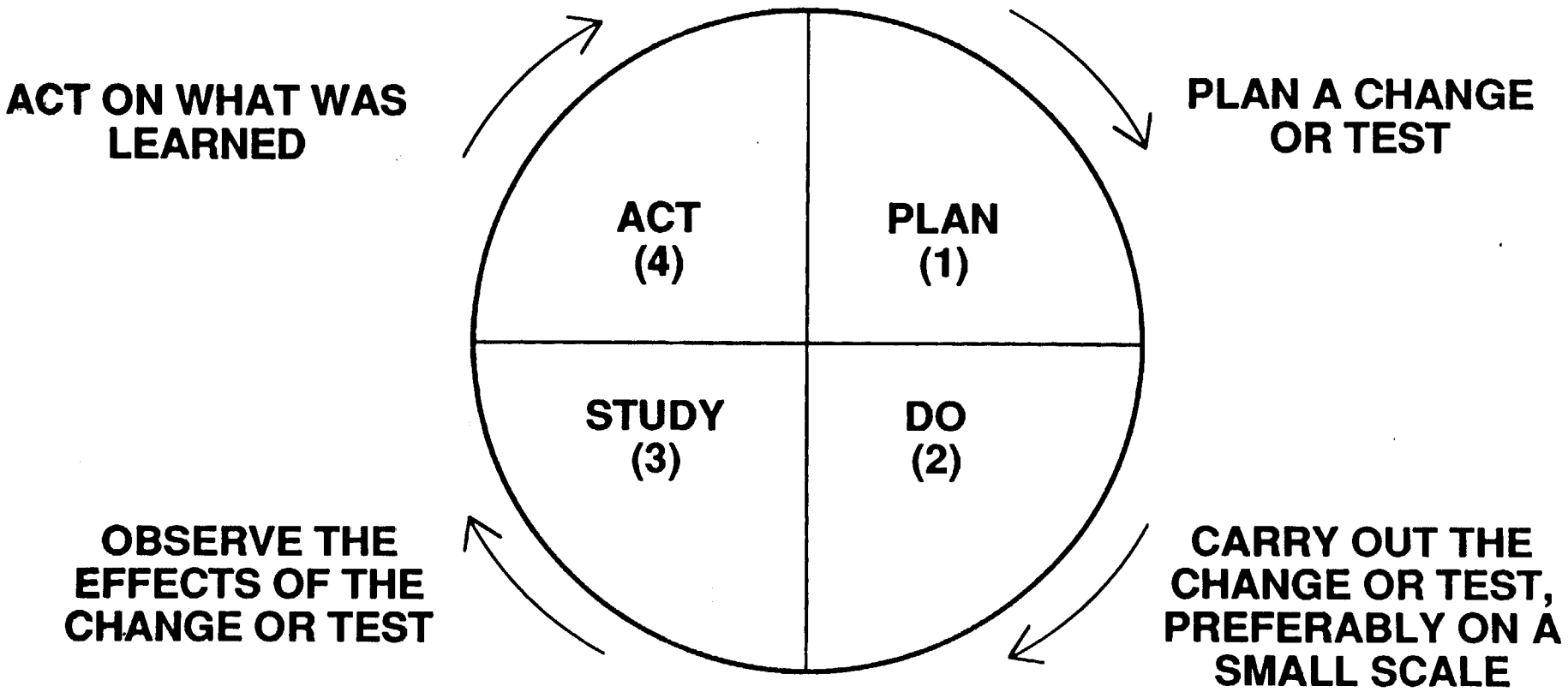
INPUT/OUTPUT MODEL



The Customer is in the Driver's Seat



The Plan-Do-Study-Act (PDSA) Cycle



(5) **Repeat Step 1, with new knowledge**

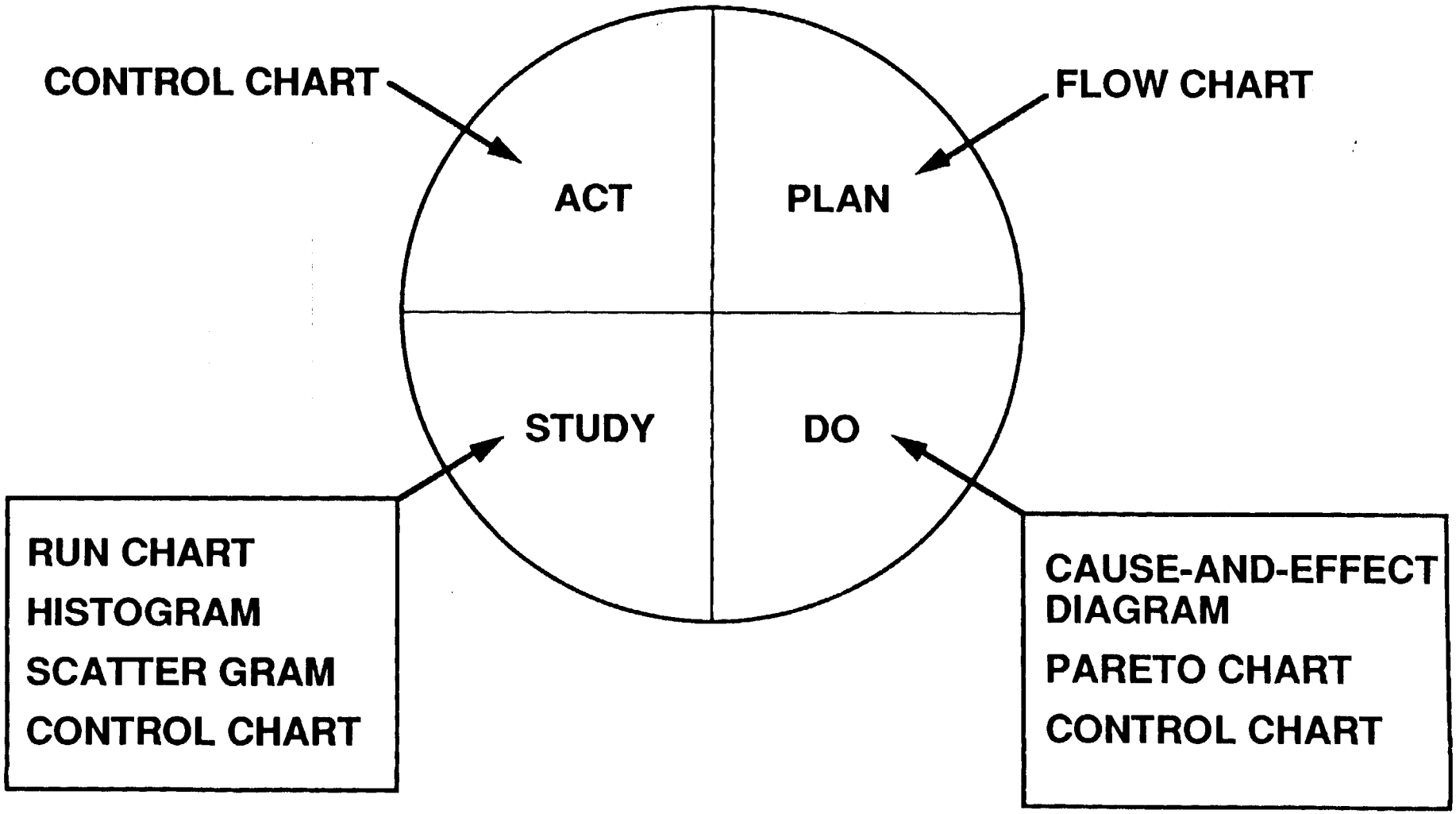
(6) **Repeat step 2, and onward**

T. 11159 (MC)

Basic Statistical Methods

- Flow Chart
- Cause-and-Effect Diagram
- Pareto Chart
- Scatter Diagram
- Histogram
- Run Chart
- Control Chart

Typical Applications of the Seven Graphic Tools in the Shewhart Cycle



T. 11159 (MC)

TQM RESOURCE LIST #1

PROJECT MANAGEMENT INTRODUCTORY TEXTS
July 1992

Provided by the Program/Project Management Librarian
at NASA Headquarters Library

Introduction

The following titles are available in the Program/Project Management Collection at NASA Headquarters James C. Fletcher Memorial Library. This list represents but a sampling of the PPM collection which covers all aspects of project management, including many that also deal with total quality management.

****

Cleland, David I. A Project Management Dictionary of Terms. New York: Van Nostrand Reinhold, 1985. **PM HD69 .P75 C525 1985**

Dinsmore, Paul. Human Factors in Project Management. New York: American Management Association, 1984. **PM HD69 .P75 D57**

Gareis, Roland, ed. Handbook of Management by Projects. Vienna: MANZ, 1990. **PM HD69 .P75 H36 1990**

Hoban, Francis T., ed. Issues in NASA Program and Project Management. Washington, D.C.: NASA, 1988- **PM TL521.312 .I77**
[You may also call the PPM Librarian to get on the mailing list for this]

Kezsbom, Deborah S., Donald L. Schilling and Katherine A. Edward. Dynamic Project Management: A Practical Guide for Managers and Engineers. New York: Wiley, 1989. **PM T56.8 .K45 1989**

Kimmons, Robert L. Project Management Basics: a Step by Step Approach. New York: M. Dekker, 1990. **PM HD69 .P75 K56 1990**

King, David. Project Management Made Simple: a Guide to Successful Management of Computer Systems Projects. Englewood Cliffs, NJ: Yourdon Press, 1992. **PM T56.8 .K49 1992**

Kliem, Ralph L. The Secrets of Successful Project Management, New York: Wiley, 1986. **PM T56.8 .K65 1986**

Knutson, Joan. Project Management: How to Plan and Manage Successful Projects. New York: American Management Association, 1991. **PM T56.8 .K58 1991**

Lock, Dennis, ed. Project Management Handbook. Cambridge: Gower Technical Press, 1987. **PM T56.8 .P776 1987**

TQM RESOURCE LIST #2

DEVELOPING LEADERSHIP SKILLS
July 1992

Provided by the Program/Project Management Librarian
at NASA Headquarters Library

Introduction

The following titles are available in the Program/Project Management and/or Quality and Productivity Awareness collections at NASA Headquarters James C. Fletcher Memorial Library. A "PM" before the call number indicates the book is in the PPM Collection, a "QM" indicates the Quality Collection.

****

Badaracco, Joseph. Leadership and the Quest for Integrity. Boston: Harvard Business School Press, 1989. **PM HD57.7 .B33 1989**

Bennis, Warren G. On Becoming a Leader. Reading, MA: Addison-Wesley, 1989. **PM BF637 .L4 B37 1989**

Bennis, Warren G. Why Leaders Can't Lead: the Unconscious Conspiracy Continues. San Francisco: Jossey-Bass, 1989. **PM HM141 .B434 1989**

Bothwell, Lin. The Art of Leadership: Skill-Building Techniques That Produce Results. Englewood, Cliffs, NJ: Prentice-Hall, 1983. **PM HF5500 .B686 1983**

Briner, Wendy. Project Leadership. New York: Van Nostrand Reinhold, 1990. **PM HD69 .P75 B75 1990**

Campbell, David P. The Use of Personality Measures in the Leadership Development Program. Greensboro, NC: Center for Creative Leadership, 1985. **PM HM141 .C35 1985**

Crosby, Philip B. Leading, the Art of Becoming an Executive. New York: McGraw-Hill, 1990. **PM HD57.7 .C755 1990**

Gardner, John William. On Leadership. New York: Free Press, 1990. **PM JC330.3 .G37 1990**

Hersey, Paul. The Situational Leader. New York: Warner Books, 1985. **PM HD57.7 .H46 1985**

Hickman, Craig R. Mind of a Manager, Soul of a Leader. New York: Wiley, 1990. **PM HD31 .H4815 1990**

TQM RESOURCE LIST #3

PLANNING MEETINGS AND PRESENTATIONS
July 1992

Provided by the Program/Project Management Librarian
at NASA Headquarters Library

Introduction

The following titles are available in the Program/Project Management and/or Quality and Productivity Awareness collections at NASA Headquarters James C. Fletcher Memorial Library. A "PM" before the call number indicates the book is in the PPM Collection, a "QM" indicates the Quality Collection.

****

Arrendondo, Lani. How to Present Like a Pro!: Getting People to See Things Your Way. New York: McGraw-Hill, 1991. **PM HF5718.22 .A77 1991**

Auger, B.Y. How to Run Better Business Meetings. St. Paul, MN: Business Services Press, 1966. **PM HF5549.5 .C6 A85 1966**

Bolton, Robert. People Skills: How to Assert Yourself, Listen to Others, and Resolve Conflicts. New Yor: Simon & Schuster, 1986. **PM HM132 .B65 1986**

Bradford, Leland Powers. Making Meetings Work: a Guide for Leaders and Group Members. La Jolla, CA: University Associates, 1976. **PM HM133 .B63 1976**

D'Arcy, Jan. Technically Speaking: Proven Ways to Make Your Next Presentation a Success. New York: AMACOM, 1992. **PM HF5718.22 .D37 1992**

Deep, Samuel D. Smart Moves: 14 Steps to Keep Any Boss Happy, 8 Ways to Start Meetings on Time, and 16,000 More Tips to Get the Best From Yourself and the People Around You. Reading, MA: Addison-Wesley, 1990. **PM HF5549.5 .C6 D37 1990**

Doyle, Michael. How to Make Meetings Work: the New Interactive Method. New York: Berkley Publishing Group, 1976. **PM HM131 .D68 1976**

TQM RESOURCE LIST #4

SELECTED ARTICLES ON TQM IN THE PUBLIC SECTOR
July 1992

Provided by the Program/Project Management Librarian
at NASA Headquarters Library

Introduction

The following articles were selected because they are from journals available at NASA Headquarters James C. Fletcher Memorial Library. Everyone is invited to visit the library to read or make copies of items they find interesting. NASA employees who cannot come to the library may call the PPM Librarian at 202-358-0172 to make alternate arrangements.

****

Aaron, Robert D. "Total Quality Management: What Processes Do You Own? How Are They Doing?" Program Manager 18 #5 (September-October 1989): 17-21.

Balfour, Danny L. and Barton Weschler. "Commitment, Performance, and Productivity in Public Organizations." Public Productivity & Management Review 14 #4 (Summer 1991): 355-367.

Balk, Walter L., Geert Bouckaert and Kevin M. Bronner. "Notes on the Theory and Practice of Government Productivity Improvement." Public Productivity & Management Review 13 #2 (Winter 1989): 117-131.

Ballard, John A. and Debra M. Trent. "Idea Generation and Productivity: the Promise of CSM." Public Productivity & Management Review 12 #4 (Summer 1989): 373-386.

Bemowski, Karen. "The Benchmarking Bandwagon." Quality Progress 24 #1 (January 1991): 19-24.

Bushnell, David S. "TQM in the Public Sector: Strategies for Quality Service." National Productivity Review 11 #3 (Summer 1992): 355-370.

Cohen, Steven and Ronald Brand. "Total Quality Management in the U.S. Environmental Protection Agency." Public Productivity & Management Review 14 (Fall 1990): 99-114.

Duquette, Dennis J. and Alexis M. Stowe. "Enter the Era of Performance Measurment Reporting." Government Accountants Journal 41 #2 (Summer 1992): 19-28.

Glenn, Tom. "The Formula for Success in TQM." Bureaucrat 20 #1 (Spring 1991): 17-20.

TQM RESOURCE LIST #5

TEAMS AND TEAMWORK
July 1992

Provided by the Program/Project Management Librarian
at NASA Headquarters Library

Introduction

The following titles are available in the Program/Project Management, Quality and Productivity Awareness and/or main collections at NASA Headquarters James C. Fletcher Memorial Library. A "PM" before the call number indicates the book is in the PPM Collection, and a "QM" indicates the Quality Collection. Items without those indicators are in the main collection.

****

Barra, Ralph. Putting Quality Circles to Work: A Practical Strategy for Boosting Productivity and Profits. New York: McGraw-Hill, 1983. **HD66 .B37**

Blake, Robert R., Jane S. Mouten and Robert L. Allen. Spectacular Teamwork: How to Develop the Leadership Skills for Team Success. New York: John Wiley & Sons, I987. **HD66 .B54**

Communication and Group Decision Making. Newbury Park, CA: Sage Publications, 1986. **PM HD30.23 .C65 1986**

Cox, Allan. Straight Talk for Monday Morning: Creating Values, Vision, and Vitality at Work. New York: John Wiley & Sons, 1990. **PM HD66 .C59 1990**

Crocker, Olga. Quality Circles: A Guide to Participation and Productivity. New York: Facts on File Publications, 1984. **QM HD66 .C76 1984**

DeMarco, Tom. Peopleware: Productive Projects and Teams. New York: Dorset House, 1987. **PM HD31 .D42185 1987**

Dyer, William G. Team Building: Issues and Alternatives. Reading, MA: Addison-Wesley, 1987. **PM HD66 .D94 1987 and HD66 .D94 1987**

Gmelch, Walter H. Productivity Teams: Beyond Quality Circles. New York: Wiley, 1984. **PM HD66 .G59**

TQM RESOURCE LIST #6

THE DEMING MANAGEMENT METHOD
July 1992

Provided by the Program/Project Management Librarian
at NASA Headquarters Library

Introduction

The following items concern the Deming Management Method. The selected articles are all from journals held at NASA Headquarters James C. Fletcher Memorial Library. The books are available in the Program/Project Management and/or Quality and Productivity Awareness collections at NASA Headquarters Library as well. A "PM" before the call number indicates it is in the PPM Collection, a "QM" indicates the Quality Collection.

Reading the following material will illustrate that the 14 points of the Deming Management Method are:

1. Create consistency and continuity of purpose.
2. Refuse to allow delays and defects in workmanship.
3. Eliminate the need for mass inspection.
4. Reduce number of suppliers, and do not purchase on price alone.
5. Continuous process improvement.
6. Institute modern training methods.
7. Supervision should emphasize pride in workmanship.
8. Eliminate fear through improved communication.
9. Emphasize interdepartmental teamwork for problem solving.
10. Eliminate quantitative goals in the workplace.
11. Use statistical methods for process improvement, not quotas.
12. Eliminate barriers to pride in workmanship.
13. Increase education and training of workers in new technology.
14. Management must clearly define its commitment to quality.

****

Brown, James H. "Erie Excellence Council Applies Deming's Principles." National Productivity Review 11 (Spring 1992): 181-94.

Deming, William Edwards. Out of the Crisis. Cambridge, MA: MIT Center for Advanced Engineering Study, 1986. **PM HD70 .U5 D45 and QM HD70 .U5 D45**

Deming, William Edwards. Quality, Productivity, and Competitive Position. Cambridge, MA: MIT Center for Advanced Engineering Study, 1982. **QM TS156 .D4**

Duncan, W. Jack and Joseph G. Van Matre. "The Gospel According to Deming: Is it Really New?" Business Horizons 33 #4 (July-August 1990): 3-9.

TQM RESOURCE LIST #7

TQM METRICS AND MEASUREMENTS
Revised September 1992

Provided by the Program/Project Management Librarian
at NASA Headquarters Library

Introduction

The following titles are available in the Program/Project Management, Quality and Productivity Awareness, and/or main circulating collections at NASA Headquarters James C. Fletcher Memorial Library. A "PM" before the call number indicates it is in the PPM Collection, a "QM" indicates the Quality Collection; call numbers without those indicators are in the main collection. Titles with NTIS numbers in brackets [ ] may be ordered through RECON by filling out a form 81. Some articles are also included; copies may be made in the library.

****

Aft, Lawrence S. Productivity Measurement and Improvement. Reston, VA: Reston Publishing, 1983. **PM T60.4 .A34**

Air Force Systems Command. Metrics Handbook. Washington, D.C.: 1991. **[N92-25542]**

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Deming, W.E. Out of the Crisis. Cambridge, MA: Center for Advanced Engineering Study, 1986. **PM & QM HD70 .U5 D45**

Devries, David L. Performance Appraisal on the Line. Greensboro, NC: Center for Creative Leadership, 1986. **PM HF5549.5 .R3 P46 1986**

General Accounting Office. Government Measures of Private-Sector Productivity: Users Recommend Changes. Washington, D.C.: 1980. **HD56.25 .U56 1980**

Glaser, Mark. "Tailoring Performance Measurement to Fit the Organization: From Generic to Germane." Public Productivity & Management Review 14 #3 (Spring 1991): 303-319.

Goddard Space Flight Center. Performance Measurement System (PMS) Handbook. Greenbelt, MD: 1988. **PM T 175.5 .P47 1988**

TQM RESOURCE LIST #8

PROJECT BUDGETING AND COST CONTROL
September 1992

Provided by the Program/Project Management Librarian
at NASA Headquarters Library

Introduction

The following titles are available in the Program/Project Management Collection at NASA Headquarters James C. Fletcher Memorial Library. Items either deal solely with budgeting and cost control, or include useful chapters on the subject.

****

Badiru, Adedeji. "Economic Aspects of Project Management." [Chapter 5] Project Management Tools for Engineering and Management Professionals. Norcross, GA: Institute of Industrial Engineers, 1991. **PM TA190 .B34 1991**

Cost Realism Handbook for Assuring More Realistic Contractor Cost Proposals. Washington, D.C.: Navy Office for Acquisition Research, 1985. **PM HD47.3 .T69 1985**

de Neufville, Richard. "Cost Estimation." [Chapter 14] Applied Systems Analysis: Engineering Planning and Technology Management. New York: McGraw-Hill, 1990. **PM TA177.4 .D45 1990**

Fleming, Quentin W. Cost/Schedule Control Systems Criteria: The Management Guide to C/SCSC. Chicago: Probus Publishing, 1988 **PM HD47.3 .F64 1988**

Kerzner, Harold. "Cost Control." [Chapter 15] Project Management: A Systems Approach to Planning, Scheduling and Controlling. New York: Van Nostrand Reinhold, 1989. **PM HD69 .P75 K47 1989**

Kerzner, Harold and Hans J. Thamhain. "Project Cost Control." [Chapter 10] Project Management Operating Guidelines. New York: Van Nostrand Reinhold, 1986. **PM HD69 .P75 K46 1986**

Knutson, Joan Ryan. "Developing and Monitoring the Cost Baseline." [Chapter 8] How to Be a Successful Project Manager. New York: American Management Association, 1988. **PM HD69 .P75 K68 1988**

Levin, Henry M. Cost-Effectiveness: A Primer. Beverly Hills: Sage Publications, 1983. **PM HD47.4 L48**

Lock, Dennis. "Cost Control." [Part 7] Project Planner. Brookfield, VT: Gower, 1990. **PM T56.8 .L63 1990**

TQM RESOURCE LIST #10

INNOVATION/CREATIVITY IN THE WORKPLACE
September 1992

Provided by the Program/Project Management Librarian
at NASA Headquarters Library

Introduction

The following items are available in the Program/Project Management, Quality and Productivity Awareness and/or main collections at NASA Headquarters James C. Fletcher Memorial Library. A "PM" before the call number indicates the book is in the PPM Collection, a "QM" indicates the Quality Collection; books without those indicators are in the main collection. A number of journal articles have also been included, and copies may be made in the library.

****

Ackoff, Russell L. The Art of Problem Solving, Accompanied by Ackoff's Fables. New York: John Wiley, 1978. **PM HD30.29 .A25**

Adams, James L. Conceptual Blockbusting: A Guide to Better Ideas. Reading, MA: Addison-Wesley, 1986. **PM BF441 .A28 1986**

Clark, Charles H. Idea Management: How to Motivate Creativity and Innovation. New York: AMACOM, 1980. **PM HD53 .C56**

Covault, Craig. "Goldin Presses NASA Reform While Seeking Innovation, New Vision." Aviation Week & Space Technology 136 #19 (May 11, 1992): 19-20.

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Diebold, John. Making the Future Work: Unleashing Our Powers of Innovation for the Decades Ahead. New York: Simon & Schuster, 1984. **HD70 .U5 D53**

Drucker, Peter. Innovation and Entrepreneurship: Practice and Principles. New York: Harper & Row, 1985. **PM HD2346 .U5 D78 1985**

Gallupe, R. Brent and others. "Electronic Brainstorming and Group Size." Academy of Management Journal 35 #2 (June 1992): 350-369.

Hall, Jay. The Competence Process: Managing for Commitment and Creativity. The Woodlands, TX: Teleometrics International, 1980. **PM HD57 .H32**

Linking Process Measures With Results

Gardner Shaw
Process Management International

October 28, 1992

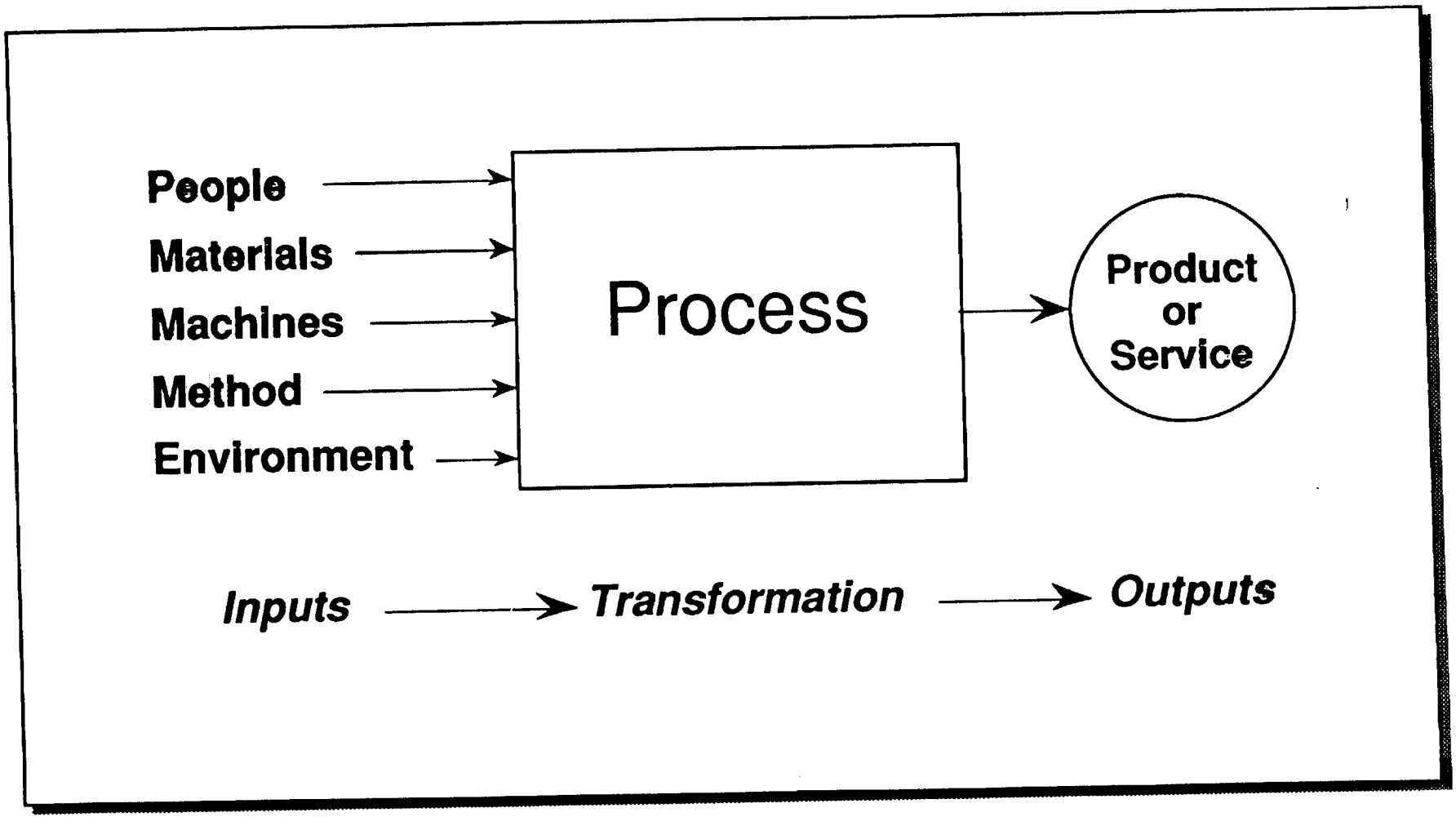
The Goal of Effective Organizations:

- To provide high-quality products or services to their customers

The Most Effective Means of Attaining that Goal:

- Create stable, predictable processes that are capable of producing quality products or services

Outputs of a Process



Definitions

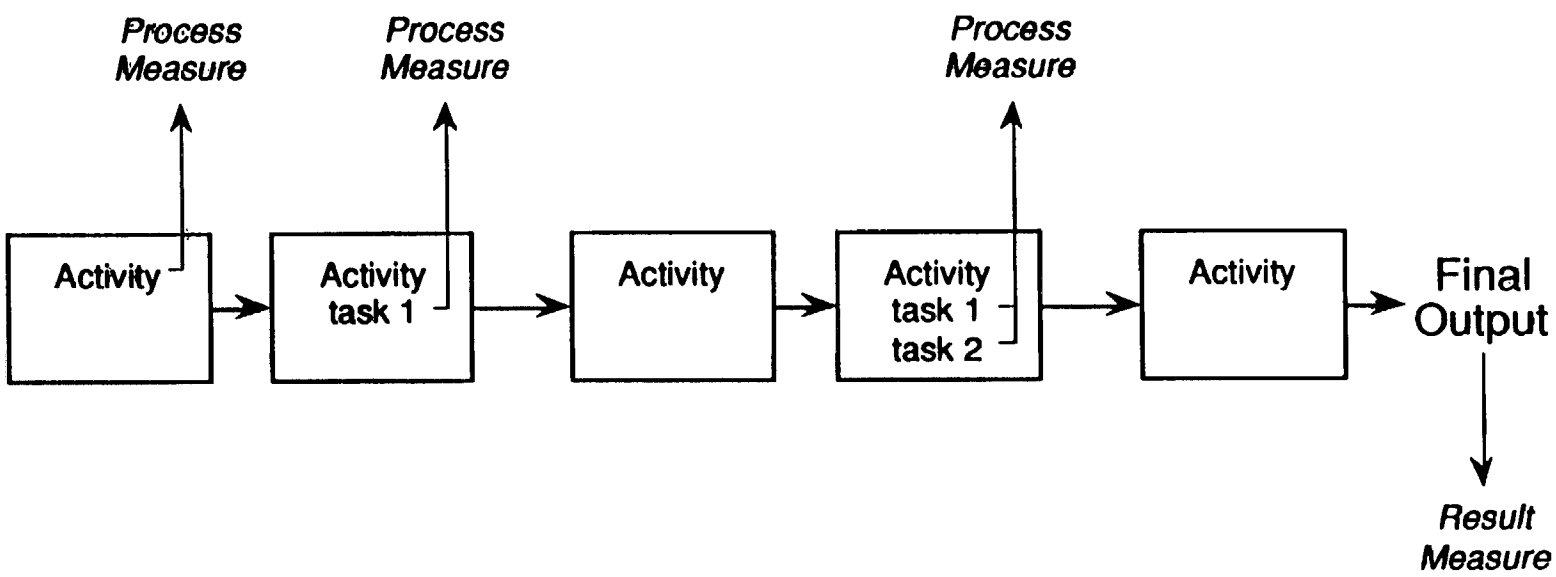
Result measure:

Data of overall process performance which closely track how well you are meeting customer requirements.

Process measure:

Upstream point in the process which influences the results measure, i.e., a change in a process measure will cause the results to vary. Process measures are used to make sure you are doing what needs to be done to achieve the desired results.

Results vs. Process Measures



To Link Process Measures with Results,

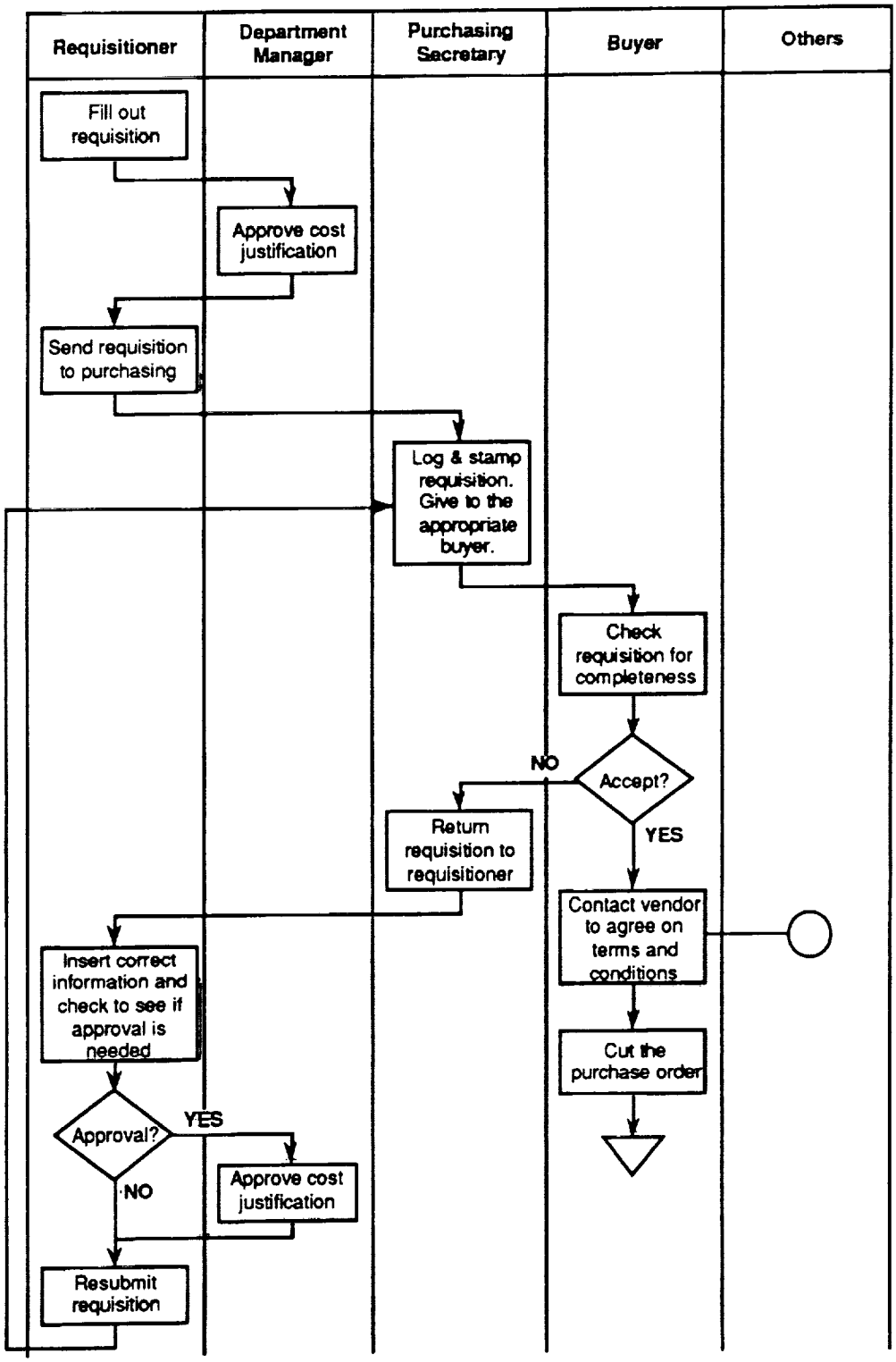
First Learn About the Process

Learn About the Process

Key questions

- Who is the process owner?
- What is the purpose and output of the process?
- How does the process flow?
- Who are the customers and what are their requirements?
- Who are the suppliers and what are their capabilities?
- What measures will be used to monitor the process?
- What are the problems in the process?

Purchasing Requisition Process



To Improve Results,

Improve the Process

Improve the Process

Key questions:

- What immediate changes will better meet customer needs?
- What are the current best methods?
- Is the process stable?
- What are the problems?
- What are the primary causes of the problem?
- How can we test our solutions?
- How can we be sure the changes result in an improved process?
- How can we monitor the process and maintain the gains?

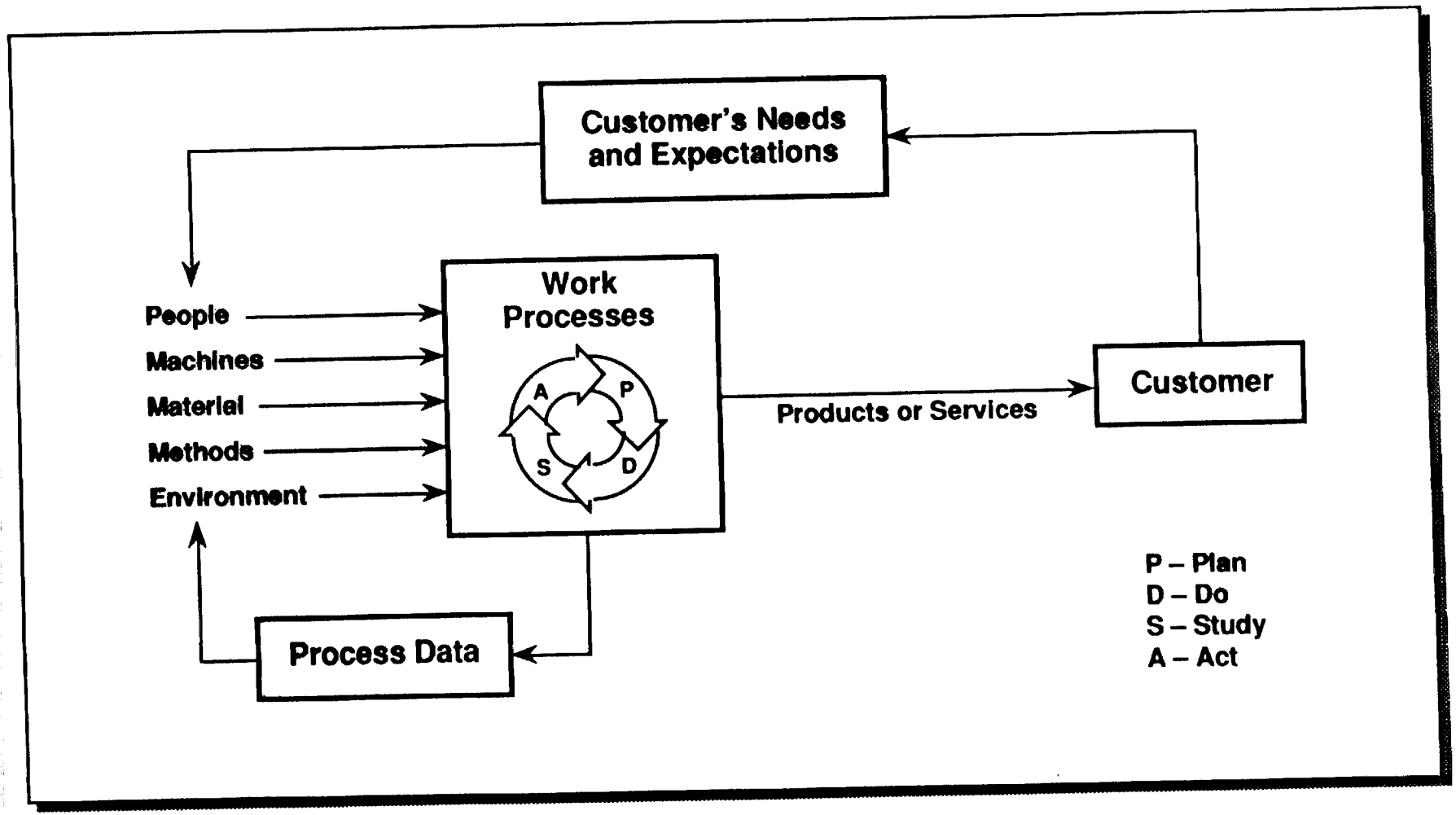
To Improve the Process,

Collect Data

"Data is like garbage, you've got to know what you're going to do with it before you collect it."

Mark Twain

Improvements on the Process



Guidelines for Collecting Data to Help Improve Processes

1. Follow the PDSA cycle.
2. Collect data over time.
3. Investigate over a wide range of factors.

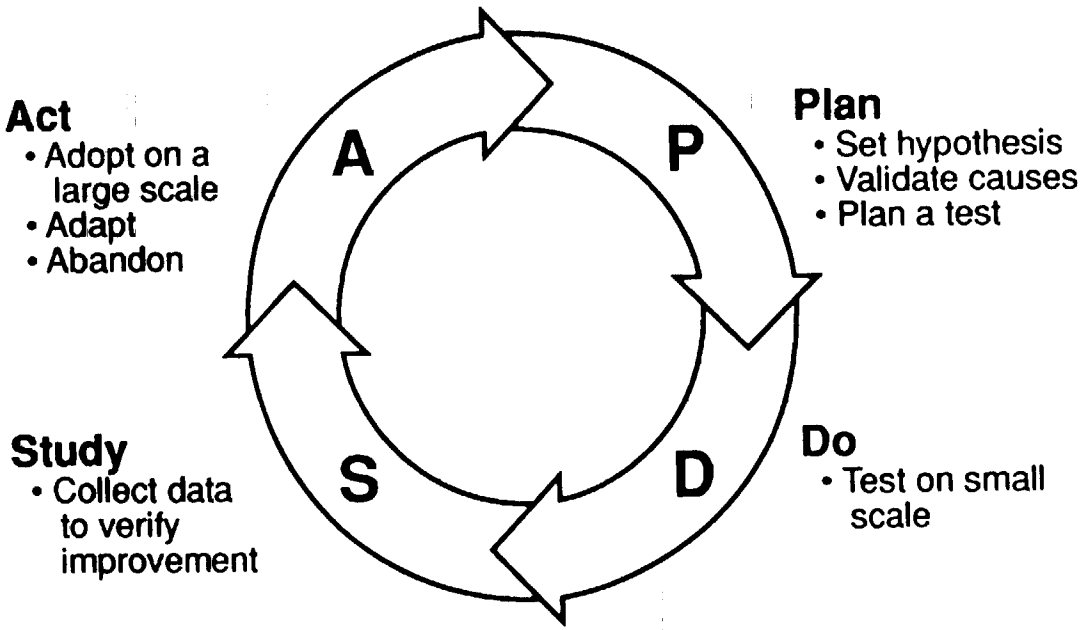
The PDSA Cycle

Plan - how you intent to make the changes in a process. Collect data to determine your plan.

Do - what you have planned in the previous step, on a trial basis.

Study - by studying the results of your actions. What occurred?

Act - on the results you observed in the previous steps by taking appropriate action or standardizing the improvement.



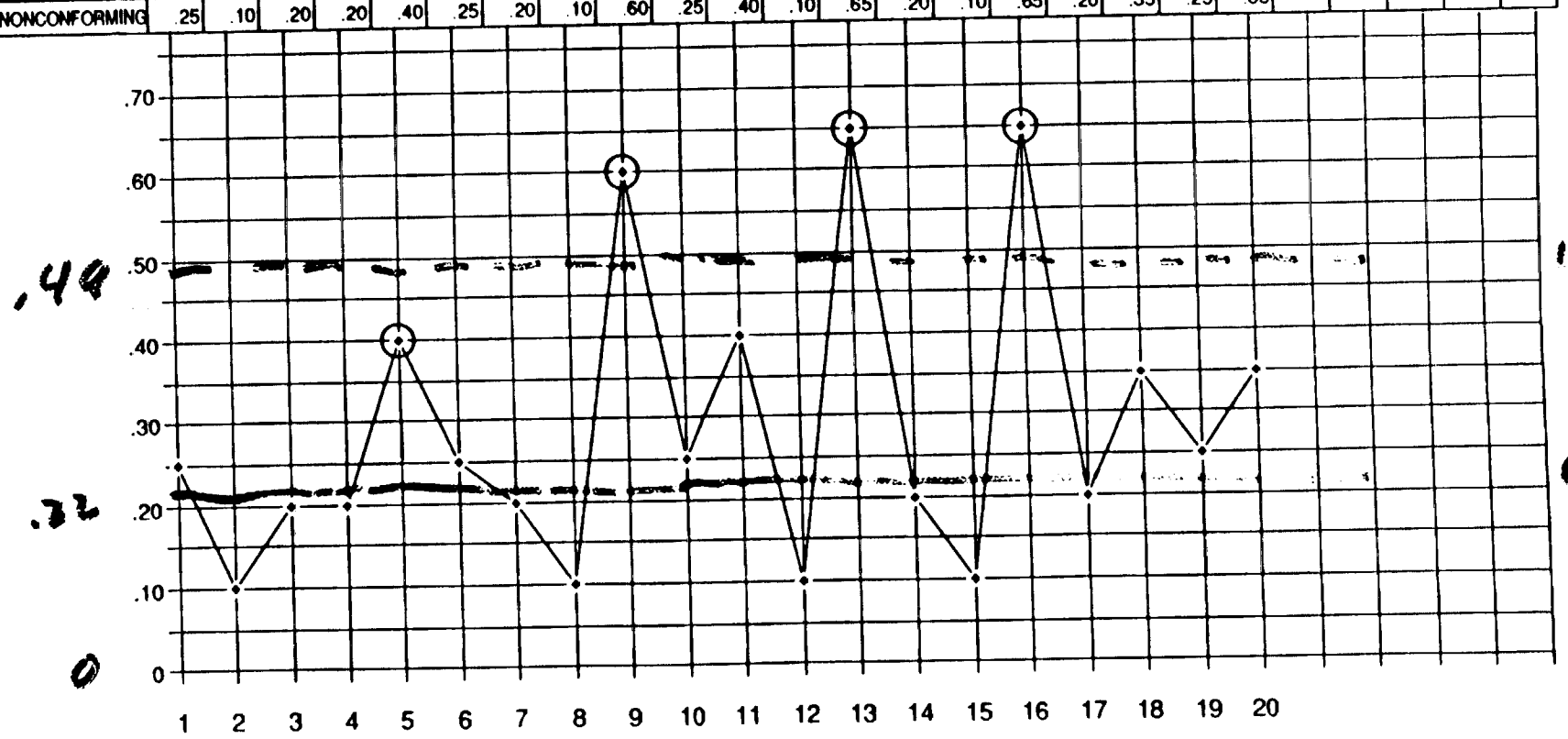
Why Measure?

Measures provide information on:

- **Current process performance**
- **Impact of changes to the process**
- **Signals of potential problems**

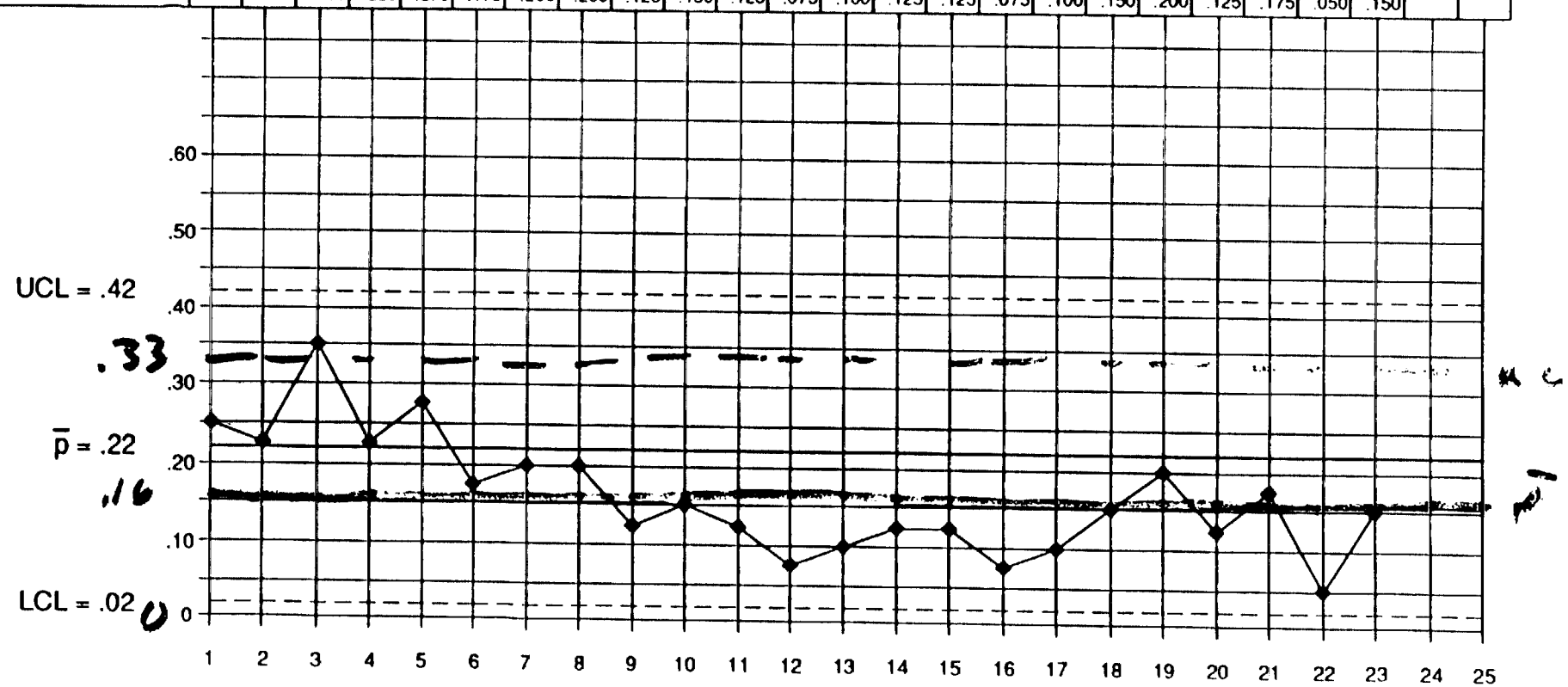
PART NAME: PURCHASING REQUISITIONS | PART NUMBER: | UNIT OF MEASURE:

DATE FEBRUARY	1	2	3	6	7	8	9	10	13	14	15	16	17	20	21	22	23	24	27	28
TIME																				
TYPE OF NONCONFORMITY:																				
No estimated cost	3	2	1	3	1	0	1	1	2	1	1	0	4	2	0	4	2	2	0	2
Level of approval	1	0	2	0	3	2	2	2	5	3	2	1	6	2	0	5	1	2	1	2
No department	2	0	0	1	2	1	0	0	1	0	1	0	1	1	0	1	0	3	2	2
Poor description	1	0	2	0	1	1	0	0	1	0	2	0	2	0	1	2	0	0	1	0
Quantity problem	0	0	0	0	2	2	1	0	2	0	2	0	1	1	1	0	0	1	0	1
No del schedule	1	0	1	0	1	0	1	0	0	2	1	0	0	0	0	2	2	1	1	2
Duplicate	0	0	0	0	2	0	0	0	3	0	0	1	1	0	0	2	0	0	1	0
NUMBER INSPECTED	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
NUMBER NONCONFORMING	5	2	4	4	8	5	4	2	12	5	8	2	13	4	2	13	4	7	5	7
FRACTION NONCONFORMING	.25	.10	.20	.20	.40	.25	.20	.10	.60	.25	.40	.10	.65	.20	.10	.65	.20	.35	.25	.35



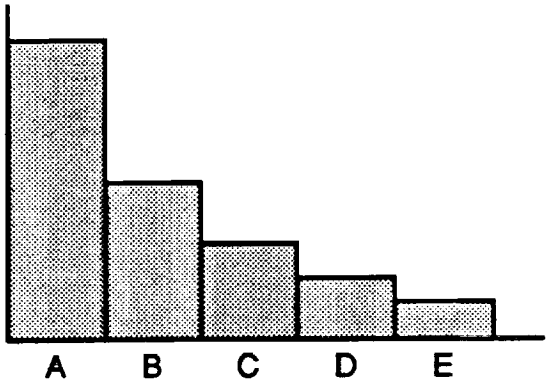
ATTRIBUTES CONTROL CHART

PART NAME: PURCHASING REQUISITIONS							PART NUMBER:									UNIT OF MEASURE:											
DATE MARCH	1	2	3	6	7	8	9	10	13	14	15	16	17	20	21	22	23	24	27	28	29	30	31				
TIME																											
TYPE OF NONCONFORMITY:																											
No estimated cost	2	3	1	3	1	3	1	1	2	1	0	1	2	1	0	0	1	0	1	0	0	0	1				
Level of approval	5	4	4	2	3	4	3	1	0	1	0	0	0	1	1	0	0	2	1	0	1	1	2				
No department	0	1	3	2	1	1	2	2	0	2	3	0	1	2	0	1	2	2	0	0	1	0	0				
Poor description	1	0	1	2	0	0	1	1	0	0	0	1	1	0	1	0	0	0	1	2	0	0	1				
Quantity problem	1	0	2	0	2	1	0	1	1	0	0	0	1	0	0	2	1	1	0	0	2	1	0				
No del schedule	1	1	0	1	2	0	1	0	1	1	1	0	0	0	1	0	0	0	2	1	0	1	0				
Duplicate	2	2	4	0	3	1	0	2	1	2	1	1	0	1	2	0	0	1	3	2	0	0	3				
NUMBER INSPECTED	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40				
NUMBER NONCONFORMING	10	9	14	9	11	7	8	7	5	6	5	3	4	5	5	3	4	6	8	5	4	2	6				
FRACTION NONCONFORMING	.250	.225	.350	.225	.275	.175	.200	.200	.125	.150	.125	.075	.100	.125	.125	.075	.100	.150	.200	.125	.175	.050	.150				



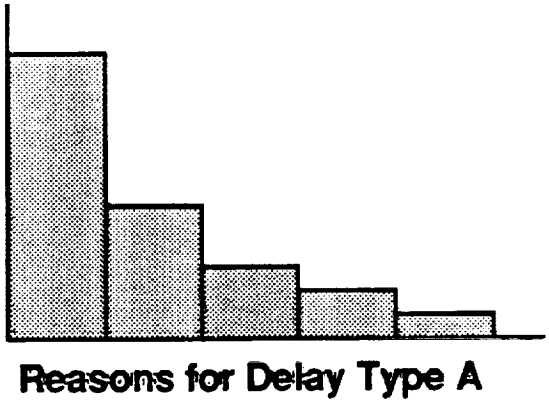
Levels of Pareto Diagrams

First level of Pareto diagram:



Delay type A is most prevalent

Second level of Pareto diagram:



Use Data to Measure the Process'

- Effectiveness
- Efficiency
- Adaptability

Effectiveness

How well the process meets customer requirements. These are typically measures of:

- Accuracy
- Reliability
- Ease of use
- Timeliness
- Performance
- Serviceability
- Price/value
- Cosmetics

Efficiency

The amount of resources required to meet customer requirements. These are typical measures:

- **Total cycle time**
- **Processing time**
- **Waiting time**
- **Per unit costs**
- **Rework costs**
- **Inspection costs**

Adaptability

How quickly and easily the process can respond to changing or special customer requirements. Typical measures:

- **Time to process a special customer request.**
- **Percent of special requests fulfilled.**
- **Number of approvals needed to meet a special request.**

General Rules for Data Collection

1. Clearly define the purpose for collecting data by:
   - Determining the purpose before collecting data.
   - Determining what to do with data once it is collected.
2. Use a data collection form/check sheet, making sure the form is clear and easy to fill out.
3. Data must be randomly collected to avoid bias.
4. Test the data collection method (form and instructions) on a small scale to ensure the procedure is not overly cumbersome or time consuming.
5. Follow and document a specific procedure in data collection; be sure to give specific instructions for collection. You want to ensure that any change you see reflects a change in the process not in the data collection method.
6. Plan your data collection, so additional factors which may help explain the results are collected, i.e., type, location, time, method, or person.

Barriers to Data Collection

- Data that has been used to reward or punish.
- Decisions which are continually delayed because "we need more data."
- Data that is collected but never acted upon.
- Data that is the result of someone else's inspection.
- Data that is "suspect" – i.e., fudged or just made up.

To Continue to Improve,

Continue to Apply the PDSA Cycle